STANDARD HOME EARTHQUAKE RETROFIT (SHER) OVERVIEW

1. Submittal Requirements:

- 2 copies of the Standard Home Earthquake Retrofit (SHER) Plan Set, Sheets S1–S20
- 2 copies of any other plans you have drawn
- Completed building permit application

2. Fees:

- $40.00 at application
- $27.50 at permit issuance
- Total fee is $67.50

3. Review Process:

- Review by a building plans examiner
- Approval in approximately one week
- If home doesn't qualify to use SHER Plan, plans examiner will advise
- Your home can still be retrofitted but additional engineering will be needed
- You will be called when the approved plans are ready to be issued

4. Inspection Process:

- Do not begin work until the permit has been issued
- Call inspector to verify anchor bolt installation
- Call inspector for a pony wall strengthening inspection
- You will need to be present at the inspection so the inspector can get under the house

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January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

Plan Details Reference Sheet

Developed in cooperation with:

THE CITY OF BOTHELL, WASHINGTON	425 837-3100
THE CITY OF REDMOND, WASHINGTON	425 556-2473
BUILDING INDUSTRY ASSOCIATION OF WASHINGTON	425 452-6864
CITY OF KIRKLAND	425 828-1144

PROJECT IMPACT SEATTLE — BUILDING A DISASTER RESISTANT COMMUNITY

Sheet

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PROJECT IMPACT
Home Earthquake Retrofit Program

3/2000

THE HOME ASSESSMENT CHECKLIST

Home Earthquake Retrofit Information Series Booklet 2 provides detailed instructions for completing this checklist. "Yes" answers to all questions indicates the home (1) qualifies to use the SHER Plan; (2) is adequately anchored and braced to resist earthquake ground shaking; and (3) is constructed of structural elements that are in good condition. Space is provided at the end of the checklist for you to enter comments related to questions answered "no" or "uncertain".

The plans examiner will make the determine is your proposal meets the requirements to use the SHER Plan based on your answers.

Complete the Qualification Checklist before application.

Qualification Requirements

All "Yes" or "NA" (not applicable) answers mean your home is qualified to use the Standard Home Earthquake Retrofit (SHER) Plan. You may need to hire an engineer or architect to develop the appropriate retrofit method if "no" or "uncertain" is checked.

Home Characteristics	Yes or NA	No	Uncertain
1. Is the home of light, wood-frame residential construction?			
2. Does the home have four or fewer dwelling units?			
3. Is the roof made of standard lightweight roofing materials, such as wood or composition shingle?			
4. Is the home built on a flat or moderate slope of less than 30 percent (approximately 18 degrees from horizontal)?			
5. Is the foundation wall around the perimeter of the home continuous except for allowable exclusions?			
6. Is the foundation of concrete or reinforced masonry that is in good condition?			
7. Are the pony walls 4 feet or less in height?			
8. Is the home three stories or less, counting pony walls over 14 1/2 inches as one story?			
8a. What is the overall height of the pony wall? **(Specify dimension.)**			
8b. How many floors are above the pony wall (or above the foundation)? **(Specify # of floors.)**			
9. Is a sill plate present?			

Identify Retrofit Needs for Homes Qualifying to Use the Standard Plan

All "Yes" answers indicate no retrofit work is needed. "No" or "Uncertain" answers indicate retrofit and/or repair work is needed to improve the resistance of the home to earthquake shaking.

Anchoring the Sill Plate	Yes or NA	No	Uncertain
10. Are sill plates in good condition?			
11. Are sill plates anchored (bolted) to the foundation?			
12. Are sill plate anchor bolts spaced 4 to 6 feet apart, placed near the center of the concrete foundation wall (about 2 1/2 inches from the side of a 6 inch foundation wall), and in good condition?			
13. Are sill plate anchor bolts at least 1/2 inch in diameter for one to two story buildings and 5/8 inch for a three-story building?			
14. Are sill plate anchor bolts located not more than 12 inches from the ends of each piece of sill plate that is more than 30 inches in length?			
Connecting the Floor Framing	**Yes or NA**	**No**	**Uncertain**
15. Are floor joists and either continuous rim joists or joist blocking present?			
16. Are pony wall double top plates present and in good condition?			
17. Is the floor framing system connected to the underlying sill plate with metal framing clips or are 8d nails placed 6 inches on center?			
18. Does the continuous rim joist rest on top of the pony wall studs?			
Strengthening the Pony Wall	**Yes or NA**	**No**	**Uncertain**
19. Do structural panels (also called sheathing) cover the stud walls on either the inside or the outside of the pony wall?			
20. Does existing pony wall sheathing in a crawl space have sufficient stud space ventilation to prevent the growth of fungus?			
21. Are the nails around the perimeter of the structural paneling spaced 3 to 6 inches apart?			
22. Are the nails along the studs spaced 6 to 14 inches apart?			
23. Are there screened ventilation holes in each structural panel located in the crawl space?			

Comments about "No" or "Uncertain" answers:

Name and daytime phone number of person who completed the Home Assessment Checklist (PLEASE PRINT)

For Office Use Only:

- ☐ Home qualifies to use the Standard Home Earthquake Retrofit Plan
- ☐ Home does not qualify to use the Standard Home Earthquake Retrofit Plan
- ☐ Home earthquake retrofit not needed
- ☐ Damaged or missing structural elements must be repaired or installed before completing the retrofit

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

Applicant Plan Sheet

Developed in cooperation with:

City of Seattle 425 837-3100
City of Redmond 425 556-2473
City of Bellevue 425 452-6864
City of Kirkland 425 828-1144

Building a Disaster Resistant Community — Project Impact Seattle

Sheet S2

SECTION II
EARTHQUAKE RETROFIT PLAN – INSTRUCTIONS

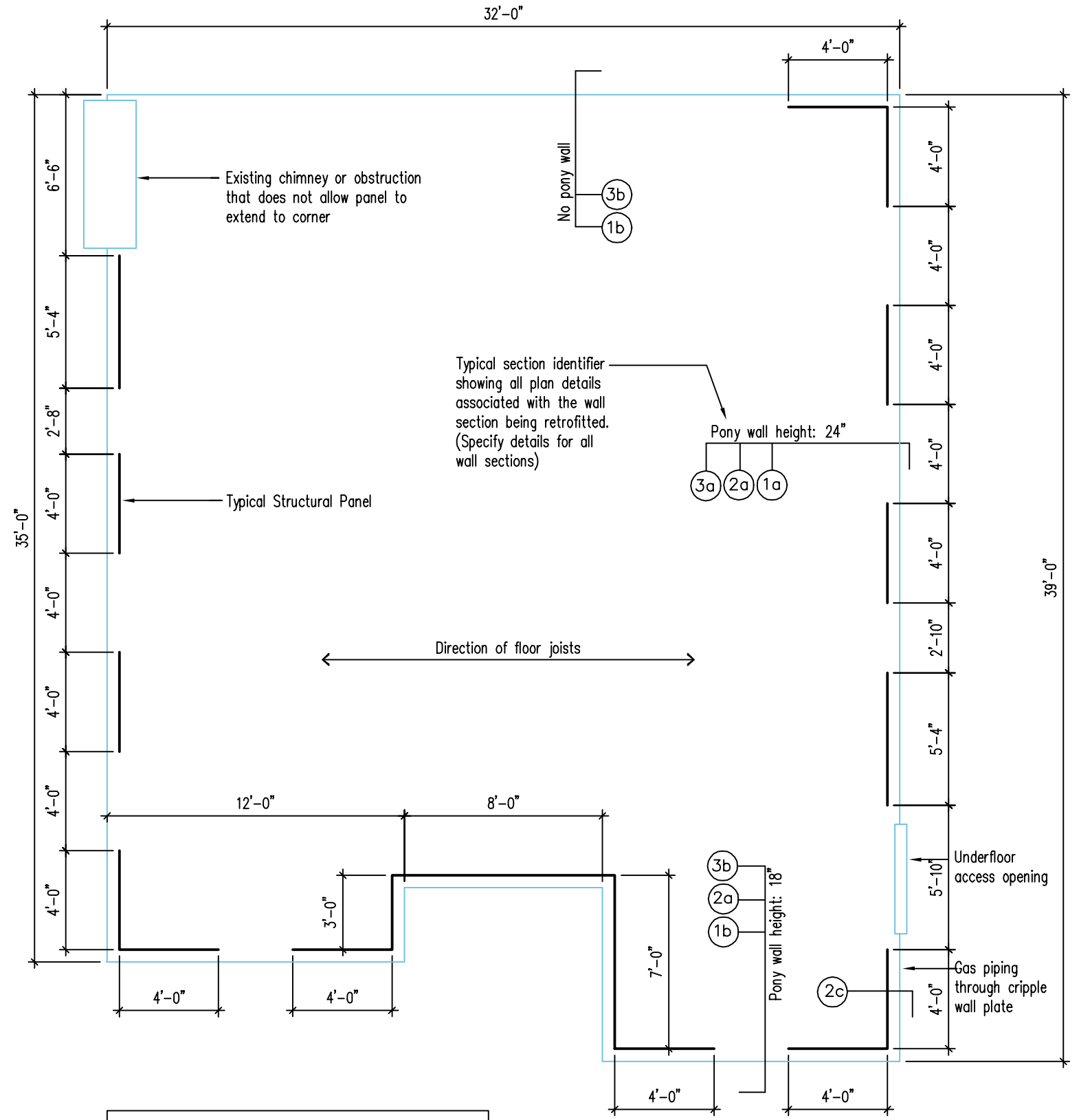
1. Help.
   Refer to the Guide to Completing Your Earthquake Retrofit Plan (Booklet 3, Home Retrofit Information Series) for detailed instructions on how to prepare your plan.

2. Measure and Mark Existing Conditions.
   Draw an outline of the building's foundation in the space provided (Section IIb). Mark the scale used. Show chimneys, crawlspace access, and any other gaps in the foundation wall. Note the height of all pony walls. Mark the direction of run (orientation) of all floor joists and beams on your foundation outline. For completeness show on outline of porches, garages, or additions that lack a foundation using a dashed line. Refer to the "SAMPLE PLAN" (Section IIa) for guidance.

3. Select and Mark Plan Detail Numbers.
   For each wall segment on your Earthquake Retrofit Plan, mark on the foundation outline the number of the plan detail(s) that you will use to complete your retrofit project project. Sheets S8 through S20 include details for common building conditions that meet the minimum prescriptive requirements.

4. Determine and Mark Wall Bracing Layout.
   Use the Summary of Minimum Prescriptive Requirements (Table 1 on Sheet S7) to determine the amount and placement of pony wall bracing. Show on the foundation outline the layout of the structural panels you will use to brace the pony walls.

5. You have now completed your Earthquake Retrofit Plan.



NOTE: BRACING SHOWN IS FOR A ONE-STORY HOUSE WITH A PONY WALL THAT VARIES IN HEIGHT.

SECTION IIa – SAMPLE PLAN (not to scale)

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

Plan Details Reference Sheet

Developed in cooperation with:

THE CITY OF SEATTLE — 425 837-3100
THE CITY OF REDMOND — 425 556-2473
CITY OF BELLEVUE — 425 452-6864
CITY OF KIRKLAND — 425 828-1144

PROJECT IMPACT — BUILDING A DISASTER RESISTANT COMMUNITY — SEATTLE

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January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING
WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK
PONY WALLS AND UNBOLTED SILL PLATES

Applicant Plan Set

Developed in cooperation with:

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THE CITY OF KIRKLAND WASHINGTON	425 556-2473
BELLEVUE WASHINGTON	425 452-6864
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PROJECT IMPACT SEATTLE — DISASTER RESISTANT COMMUNITY — BUILDING

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SECTION IIb – EARTHQUAKE RETROFIT PLAN

CHECK SCALE USED:
- ☐ ONE SQUARE = ONE FOOT
- ☐ ONE SQUARE = TWO FEET

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SECTION III – GENERAL NOTES

A. PURPOSE

The intent of the Standard Home Earthquake Retrofit Plan is to promote public safety and welfare by reducing the risk of earthquake-induced damage in existing wood frame residential buildings. The requirements in this plan define a minimum recommended standard for the retrofit of these existing buildings. Damage to homes in past earthquakes show that incorrect or incomplete retrofits are as bad as having no retrofit at all. Use of this standard plan is intended to improve building performance during earthquake shaking, but will not necessarily eliminate earthquake damage. The primary purpose is to reduce the likelihood that these buildings will fall off their foundations.

B. SCOPE

The standard plan applies to one, two and three story light wood-frame residential buildings with raised wood floors meeting the following criteria as determined by the completion of the Home Assessment Checklist:

1. The maximum number of dwelling units and/or guest rooms is four.
2. The roof is made of standard lightweight roofing materials.
3. No portion of the building is constructed over a slope steeper than 3 horizontal to 1 vertical.
4. The building is supported at its perimeter by a continuous concrete or reinforced masonry footing and stem wall in good condition.
5. The pony wall heights do not exceed 48 inches in one or two story buildings and do not exceed 18½ inches height in three story buildings.
6. The pony walls are sheathed with materials other than wood structural panels or diagonal sheathing.

C. GENERAL REQUIREMENTS

Permit requirements: All work shown on these plans requires a building permit.
Inspection requirements: All work is subject to inspection by the local building inspector. In general, this will involve two inspections. A final sign off by inspectors is required when the work is complete. If new concrete foundations are involved, an additional inspection will be required after all forming and placement of reinforcing, but before concrete pouring. In addition, if the contractor wishes to discuss construction specifics with the inspector, a separate inspection may be necessary.

D. DEFINITIONS

Anchor side plate is a metal plate or plates used to connect the sill plate or floor framing to the side of a concrete stem wall when conditions prevent chemical anchor or expansion bolt installation vertically through the sill plate.

Approval is current product acceptance under an ICBO (International Conference of Building Officials) evaluation report or equivalent.

Chemical anchor is a fastener placed in hardened concrete that derives its holding strength from a chemical adhesive compound placed between the wall of the hole and the embedded portion of the anchor. Chemical anchor compounds are organic compounds comprised of resin and hardener, that form adhesives when blended together. Examples of chemical adhesive compounds include epoxies, polyurethane, polyesters, methyl methacrylate and vinyl esters.

Embedment depth is the depth of the anchor into the concrete prior to setting of the anchor

Expansion bolt is a mechanical fastener placed in hardened concrete designed to expand in a self-drilled or pre-drilled hole of a specified size and engage the sides of the hole in one or more locations to develop shear and/or tension resistance to applied loads without grout, adhesive or drypack.

Installation torque is the minimum moment applied to a torque-set anchor that creates the degree of anchorage required for full load values.

Minimum concrete edge distance is the measure between the free edge of the concrete and the centerline of the bolt at which the concrete will not break away when the anchor is set or loaded in service. Minimum edge distances for anchors are given in the product approval.

Oriented strand board (OSB) is a mat-formed wood structural panel composed of thin rectangular wood strands or wafers arranged in oriented layers and bonded with waterproof adhesive.

Pony wall is a wood-framed stud wall extending from the top of the foundation to the underside of the lowest floor framing. Also called a cripple wall or a knee wall.

Snug tight is the condition when the full surface of the plate washer is in contact with the wood member and begins to slightly indent the wood surface.

Structural panel in the standard plan refers to a product composed primarily of wood and meeting the requirements of the United States Voluntary Product Standard PS 1 and PS 2, including all-veneer plywood and OSB.

Torque-set anchor is an expansion bolt whose wedge or sleeve engages the concrete base material in the drilled hole by the application of torque and where the amount of torque applied controls the degree of anchorage.

E. MATERIALS

Adhesive packaging: The packaging for each adhesive shall be marked with the manufacturer's name and address, lot number of date or packaging, shelf life or expiration date, name of the quality control agency, and instructions for installation. No adhesive shall be used after its expiration date.

Anchors, including chemical anchors and expansion bolts: all adhesive or expansion anchors shall have a minimum normal load capacity of 635 lbs. for 1/2 inch bolts and 980 lbs. for 5/8 inch bolts in 2000 psi concrete at the installed edge distance and depth of embedment. All proprietary anchors shall have current ICBO or equivalent approval.

Anchor side plate: All anchor side plates shall be of minimum 7 gauge steel (3/16 inch) and galvanized when exposed to weather. The minimum seismic adjusted load capacity for shear in the direction of the sill plate must meet or exceed a capacity of 1260 lbs when substituted for 5/8 inch bolts and 840 lbs when substituted for 1/2 inch bolts. Other products with lower approved capacities may be used if their required spacing is reduced proportionately by the ratio of their strength to the strength requirement above. For example, (400 lbs/840 lbs) x 72 in. o.c. = 34 in. o.c. instead of 72 in o.c. for one-story using an anchor side plate with allowable values of 400 lbs instead of 840 lbs or greater. Anchor side plates shall be attached to the concrete stem wall with a minimum of two 1/2 inch approved anchors. The number of expansion or adhesive anchors used must have a total shear capacity in concrete equal or greater to the value for the foundation anchor requirement above.

Chemical anchor rod materials: All chemical anchors shall use all-thread rod manufactured from ASTM A36 or SAE 1018 material to meet the mechanical requirements of ASTM A307. All thread rods shall be free of oil, scale and rust. The use of smooth or partially threaded rods or bolts is prohibited.

Concrete: All new concrete for replacement footings shall be of 2500 psi minimum compressive strength. No special inspection is required.

Framing clips: All framing clips shall be of minimum 18 gauge galvanized steel, of 4-1/2 inch length and approved under ICBO or equivalent for wood frame construction. The seismic load capacity in the long direction must meet or exceed 385 lbs in dry lumber. The fasteners must be 12-8d common x 1-1/2 inch nails unless otherwise approved. #6 x 1-1/2 inch flat head wood screws may be used at existing rim joist, blocking or top plate connections.

Lumber: All new lumber installed for joist blocking shall be a minimum of nominal two inch Hemfir #2 or better as graded under Western Wood Products Grading Rules. All lumber in contact with concrete shall be pressure treated hem fir for new stem walls and for sill plate replacements over 10% of the wall length. Replacement of sill plate less than 10% of the wall length may use the same lumber species as the existing materials. All existing lumber shall be free of defects including dry rot, mildew, excessive wane, warping and insect infestation or damage. Damaged lumber must be replaced and the source of water or insect intrusion removed.

Plate washers: Square plate washers are required. Use 3/16 x 2 x 2 for 1/2 inch anchors and 1/4 x 2-1/2 x 2-1/2 for 5/8 inch anchors. Standard circular cut washers shall not be used to connect sill plates to concrete stem walls. Washers furnished with the proprietary anchors shall not be used. Beveled washers shall be used on anchors drilled at an angle exceeding 6 degrees from vertical and shall be placed over the plate washers.

Reinforcing bar: ASTM A615 Grade 40 or 60

Structural panels (Sheathing): All plywood shall be graded under United States Voluntary Product Standard UBC 23-2 and 23-3. All structural panel sheathing used for wall bracing shall be 15/32 inch or 1/2 inch APA Rated Sheathing, Oriented Strand Board or CDX. Sheathing of 4-ply or better is recommended.

Structural panel fasteners: Nails shall be 8d common (.131 inch x 2-1/2 inch) with full heads (.281 inch) on interior or covered interior structural panel when plaster exists on the exterior side of the pony wall.

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CITY OF KIRKLAND 425 828-1144

DISASTER RESISTANT COMMUNITY BUILDING PROJECT IMPACT SEATTLE

SECTION III – GENERAL NOTES (continued)

F. REPLACEMENT OF EXISTING FOOTINGS & STEM WALLS

1. Deteriorated, cracked or unreinforced masonry footings may be replaced as shown on this plan provided proper shoring is provided. The method of shoring and sequence of its construction shall be the responsibility of the person performing the work and shall not weaken the structure so as to be a threat to the safety of its occupants or passers nearby.
2. When existing footings and stem walls are replaced in sections, the person performing the work shall take care to insure that all reinforcing steel shall be lapped a minimum of 24 inches and shall be doweled into the existing concrete with adhesive or drypack a minimum of 8 inches.
3. The repair of damaged footings or stem walls or the continued use of archaic building materials such as unreinforced masonry, requires that plans and calculations be prepared by a licensed architect or engineer.

G. ANCHOR BOLT INSTALLATION

1. General Requirements

(a) Condition of existing concrete: All concrete shall be fully cured and hardened, uncracked and in sound condition. Concrete with excessive cracking, deterioration or damage shall be replaced.

(b) Condition of existing anchor bolts: Existing sill plate anchor bolts cast in concrete and in sound condition shall be permitted to provide all or a portion of the sill plate connection required if the anchor bolt diameter and spacing meet or exceed the requirements in the Summary of Minimum Prescriptive Requirements and the sill plate is connected to a snug tight condition under the torque test requirement.

(c) Drilling of the hole in concrete: The drilled hole diameter and minimums for spacing, depth of hole and edge distance must comply with an ICBO Evaluation Report or equivalent approval and manufacturer's recommendations. All holes shall be drilled with carbide–tipped drill bits conforming to ANSI Specification B94–12–77 tolerances (1/2 = 0.520–0.530, 5/8 = 0.650–0.660 inches). Worn drill bits with reduced diameters below the ANSI tolerance limits shall not be used. All holes shall be driven as perpendicular as possible to the concrete surface. Right angle drill motors shall be used as needed to provide the proper hole orientation.

(d) Choosing between expansion bolts or chemical anchors: Expansion bolts or chemical anchors may be used interchangeably in concrete of average or better quality. Concrete of weaker quality may be indicated by spalling during drilling or setting of expansion bolts or failure of anchors to reach the minimum torque required. Chemical anchors must be used in weaker quality concrete. This requirement does not waive the need to replace existing concrete foundations when damaged, deteriorated, or of unsuitable quality.

2. Requirements for Installing Chemical Anchors.

(a) Cleaning of the hole: The hole must be cleaned with a jet of compressed air and a nylon brush. Wire brushes shall not be used to clean the hole. No debris or dust shall remain in the hole.

(b) Placement of the adhesive: The resin, filler and hardener shall be thoroughly mixed before placement in the hole unless approved to be mixed in the hole. Compounds dispensed through a static mixing nozzle must be of uniform color. Ensure uniform color by extruding a small amount of adhesive until color uniformity is achieved. Adhesive added to the hole shall obe applied at a slow enough rate to prevent the formation of air voids. The threads and annular space about the threaded rod in both the concrete and any existing wood sill plate. Adhesives must be installed within the manufacturer's recommended temperature range for the air and concrete.

(c) Placement of the threaded rod: The all thread rod, completely free of rust, scale or oil, shall be installed to the full depth of the hole. The rod shall be turned counter–clockwise sufficiently during installation for the adhesive to engage the threads. The length of the rod shall extend a minimum of one rod diameter above the nut after tightening.

(d) Adhesive setting time: No torquing of the anchors shall occur until the adhesive has cured for the recommended time based on the temperature as shown in the manufacturer's instructions. Care must be used to insure that the anchor bond is not disturbed until the adhesive has sufficiently cured.

(e) Torque requirements: A minimum torque setting of 30 ft lbs. for 1/2 inch anchors and 40 ft lbs. for 5/8 inch anchors is required for all chemical anchors for the snug tight condition unless this value exceeds the maximum torque allowed by the approval. In those cases, the torque shall be set to its maximum allowable value.

3. Requirements for Installing Expansion Bolts

(a) Drilling of the hole: Care must be used to insure that the drilled hole carefully matches the depth and diameter requirements for the expansion bolt type. The depth of the hole cannot exceed 2/3 of the concrete thickness in the direction of the drilled hole. This is critical at the application of anchor side plates to full height concrete stem walls.

(b) Cleaning of the hole: Unless otherwise required by the manufacturer's recommendations, the drilled hole may be deepened to allow the concrete debris to remain in the hole provided the hole does not exceed 2/3 of the concrete thickness in the direction of the drilled hole. The depth required for embedment must be free of debris. This rule does not apply to drop–in anchors that rely on the bottom of a clean drilled hole to set the expansion element.

3. Requirements for Installing Expansion Bolts (Cont'd.)

(c) Torque requirements: A minimum torque setting equal to the installation torque or 30 ft lbs. for 1/2 inch bolts and 40 ft lbs. for 5/8 inch bolts, which ever is greater, is required for all expansion bolts unless this value exceeds the maximum torque allowed by the approval. In those cases, the torque shall be set to its maximum allowable value.

H. ANCHOR SIDE PLATE INSTALLTION

1. Anchor side plates may be substituted for vertically placed chemical anchors or expansion bolts only when conditions prevent anchor or bolt installation vertically through the sill plate even with a right angle drill motor. This condition commonly occurs when there is no pony wall or one of greatly reduced height.
2. A minimum of two anchor side plates must be installed on each piece of sill plate 32 inches or longer. The nearest edge of the plate shall be installed a minimum of 8 inches but not more than 12 inches from the end of the sill plate.
3. Installation of the anchor bolts in the existing concrete shall follow the information in Section G except as noted herein. Care shall be used to insure the drilled hole depth does not exceed 2/3rds of the stem wall thickness when using expansion bolts. Cleaning of the hole may be required for these expansion bolts due to the limited stem wall thickness available to overdrill the hole.
4. Lag screws and wood screws used to attach anchor side plates shall be installed as follows:
   (a) The lag or wood screw shall be located at the center of the plate thickness and shall penetrate the sill plate a minimum of 2–1/2 inches.
   (b) Lead holes shall be pre–drilled for the threaded portion of the screw as follows:
   lag screw. The pre–drill diameter for the lead hole shall not exceed 70% of the shank diameter and shall be drilled to the full depth of penetration of the lag screw. Use a 1/4 inch diameter drill bit for 3/8 inch lag screws and 1/8 inch drill bit for 1/4 inch lag screws.
   wood screw. The pre–drill diameter for the lead hole shall be about 7/8th of the diameter of the screw at the root of the thread (minimum solid diameter). Use 1/8 inch for #14 screws.
   (c) clearance holes shall also be drilled for the solid portion of the shank as follows:
   lag screw. The clearance hole shall be equal in depth and diameter to the solid portion of the shank.
   wood screw. The clearance hole shall be about 7/8ths of the diameter of the solid portion of the shank. Use a 3/16 inch drill bit for #14 screws
   (d) the threaded portion of the lag or wood screw shall be inserted in its lead hole by turning with a wrench and not by driving with a hammer or other blunt object.
   (e) soap or other lubricant shall be used on the lag or wood screws or in the lead holes for ease of installation and to prevent damage to the lag screw.
5. Wood shims may be required to fill the space between the inside edge of the sill plate and the edge of the concrete stem wall. See manufacturer's instructions.

I. PONY WALL BRACING, VENTILATION & FRAMING CLIP INSTALLATION

1. The length of the stuctural panels along the foundation shall be at least 48 inches or two times the height of the wall, whichever is greater. Bracing is required at all exterior walls. Structural panels installed on individual pony wall sections shall be nearly equal in length and nearly equally spaced along the wall. Nails shall be 8d common with a minimum shank diameter of .131 inches.
2. Framing members or blocking shall be provided at the edge of all wood structural panels.
3. Panel joints shall normally occur on the centerline of studs or shall occur on the joint of double studs when these studs are nailed with 16d common or sinker nails at 4 inches on center.
4. Panel joints shall maintain a 1/8 inch separation between panels for expansion.
5. Panels may be oriented horizontally or vertically.
6. Nails shall be driven flush but shall not fracture the surface of the structural panel sheathing. When a nail fractures the sheathing it shall be left in place and not counted as part of the required nailing. A new nail shall be driven flush to the surface within 2 inches of the discounted nail.
7. Existing ventilation must be maintained and not covered by the structural panels used to brace the pony wall.
8. Where obstructions such as foundation ventilation openings or mechanical utilities cannot be avoided in the panel width, the required panel width shall be increased by the length of the obstruction or a minimum of one stud spacing, whichever is greater.
9. Framing clips shall connect the top plate to a rim joist or to joist blocking, or, in the case without a pony wall, shall connect the sill plate to a rim joist or to joist blocking. They shall be installed with their long dimension horizontal and with all of the nail holes filled with approved nails or wood screws.

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January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

Applicant Plan Set

Developed in cooperation with:

CITY OF SEATTLE 425 837–3100
CITY OF REDMOND 425 556–2473
CITY OF BELLEVUE 425 452–6864
CITY OF KIRKLAND 425 828–1144

PROJECT IMPACT SEATTLE – DISASTER RESISTANT COMMUNITY – BUILDING

Sheet
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SECTION III – GENERAL NOTES (continued)

Table 1: Summary of Minimum Prescriptive Requirements ③

STORIES ABOVE FOUNDATION WALL (B)	ANCHOR SIZE AND SPACING ①	SHORT SILL PLATES (E, G, H)			REQUIREMENTS FOR PONY WALL BRACING (I)	FRAMING CONNECTIONS (E)	JOIST BLOCKING (E, I)
		6 ft. to < 12 ft.	30 in. to < 6 ft.	< 30 in.			
ONE	1/2 inch at 6 ft. on center maximum	3 anchors	2 anchors	1 anchor near center	Total bracing not less than 50% of wall length. Install part of bracing at each end of wall section and remainder equally spaced in between ends.	24 in. on center maximum	At alternate joist spaces ②
TWO	1/2 inch at 4 ft. on center maximum or 5/8 inch at 6 ft. on center maximum	4 anchors for 1/2 in. bolts; 3 anchors for 5/8 in. bolts	2 anchors	1 anchor near center	Total bracing not less than 70% of wall length. Install part of bracing at each end of wall section and remainder equally spaced in between ends.	24 in. on center maximum	At every joist space above Pony walls, at Alternate joist spaces at other locations ②
THREE	5/8 inch at 4 ft. on center maximum	4 anchors	2 anchors	1 anchor near center	Install bracing over 100% of the wall length.	24 in. on center maximum	At all joist spaces ②

① Letter refers to Section of General Notes, typical.

② If blocking is used between joists in place of continuous Rim Joist, one framing connection must be installed at each block.

③ Based on 1997 UCBC Tables A-6-A, A-6-B, A-6-C, and Figure A-6-8.

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Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

Applicant Plan Set

Developed in cooperation with:

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Sheet S7

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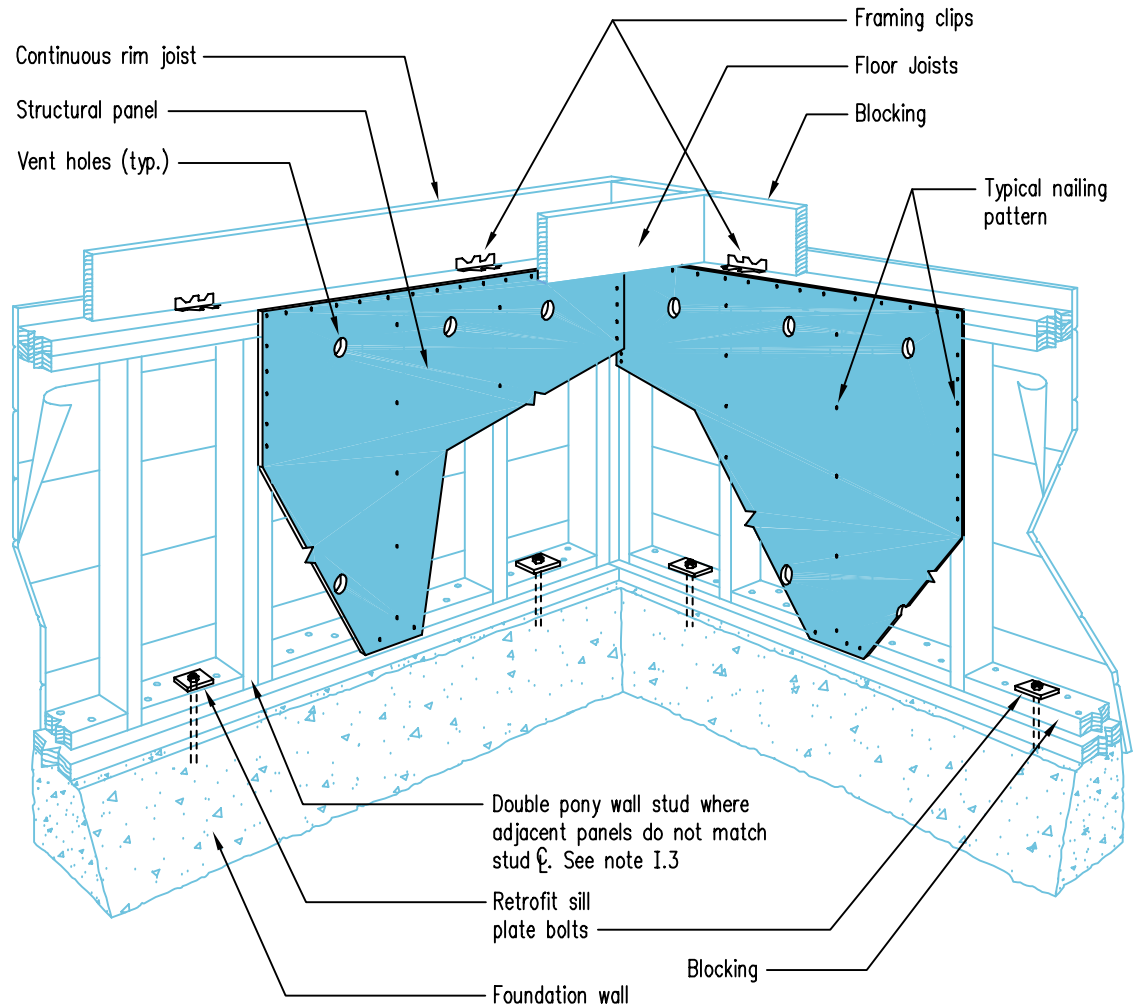
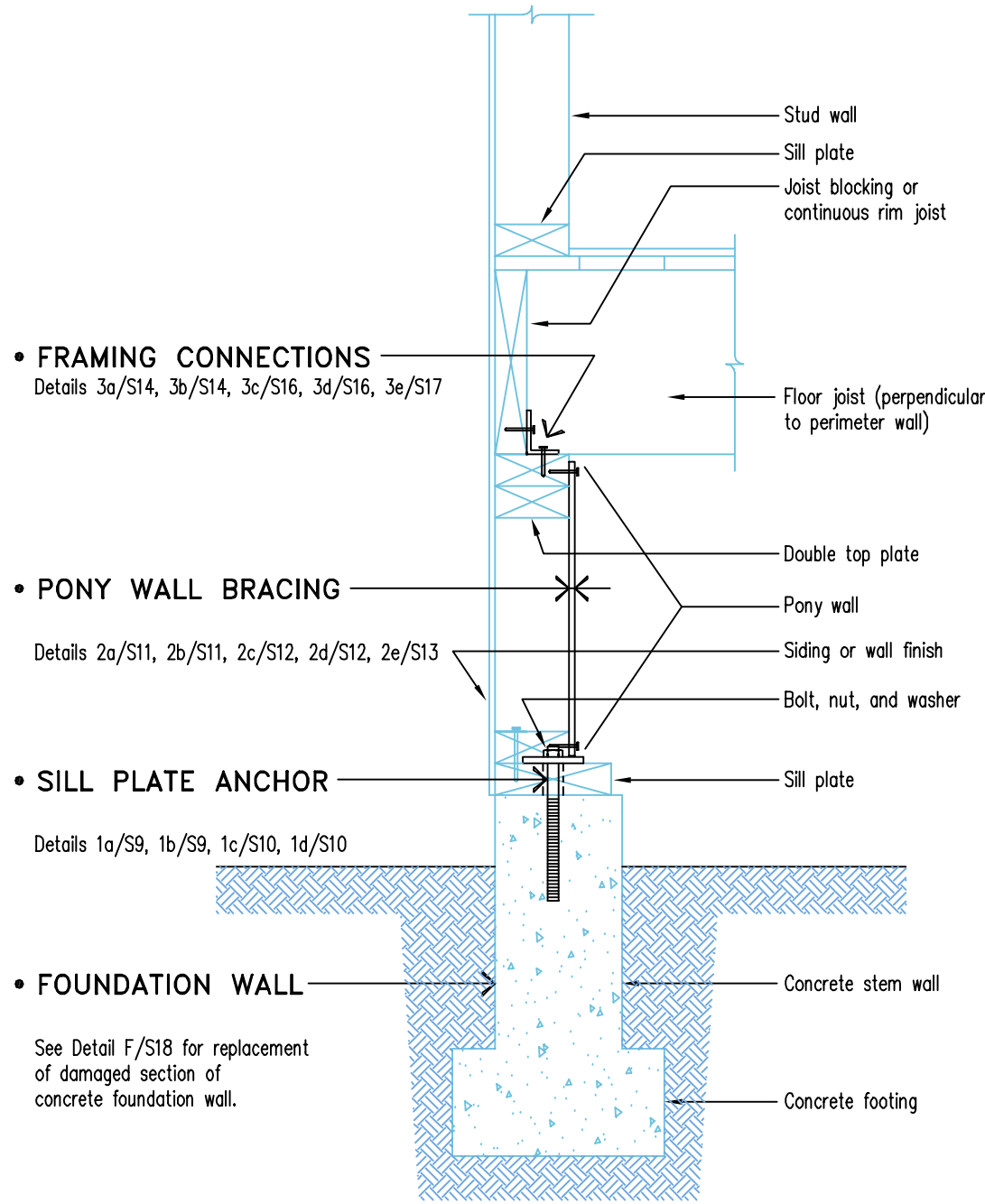


Notes:

1. This sketch shows a sample wall section that has undergone a typical seismic strengthening retrofit.
2. This is a general sketch and is not intended to supersede requirements contained in the Standard Home Earthquake Retrofit Plan or in the specific installation details.

FRONT VIEW (isometric)



Note:

1. Wall reinforcement at garage door openings is shown in Details 4a/S19, 4b/S20, and 4c/S20.

SIDE VIEW

TYPICAL WALL RETROFIT

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

Applicant Plan Set

Developed in cooperation with:

City of Seattle 425 837-3100
City of Redmond 425 556-2473
City of Bellevue 425 452-6864
City of Kirkland 425 828-1144

Building a Disaster Resistant Community Project Impact Seattle

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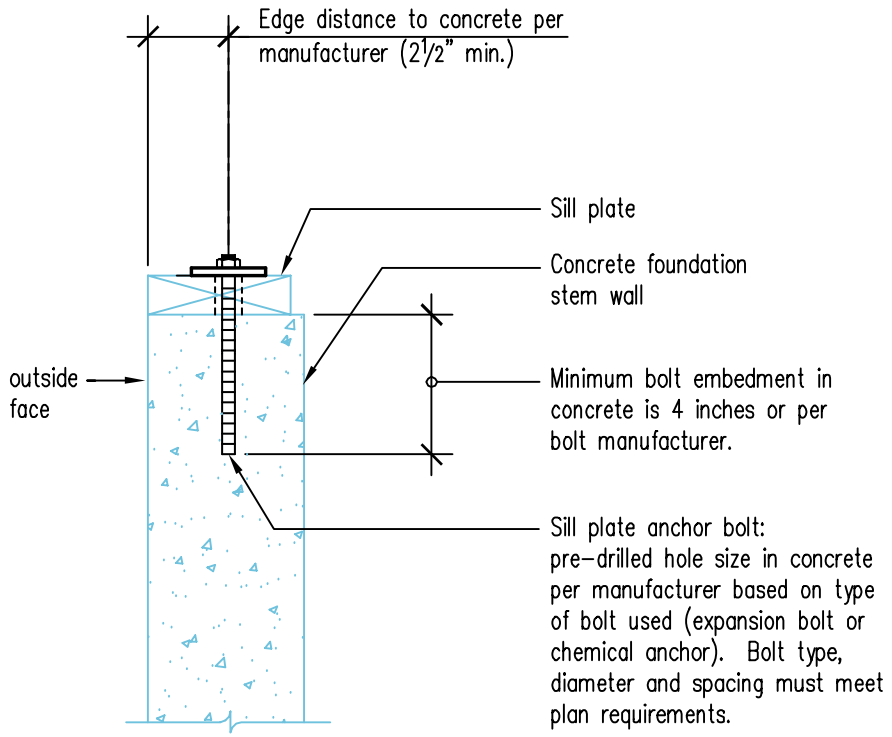

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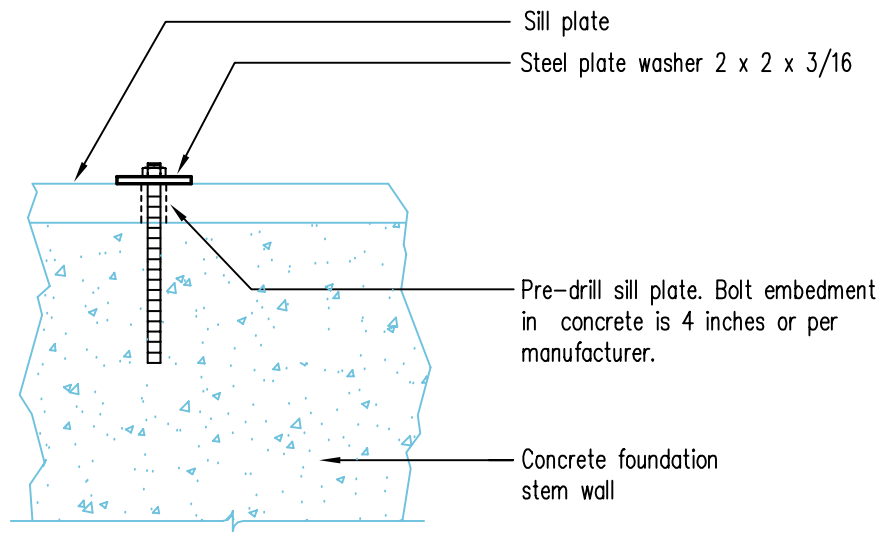
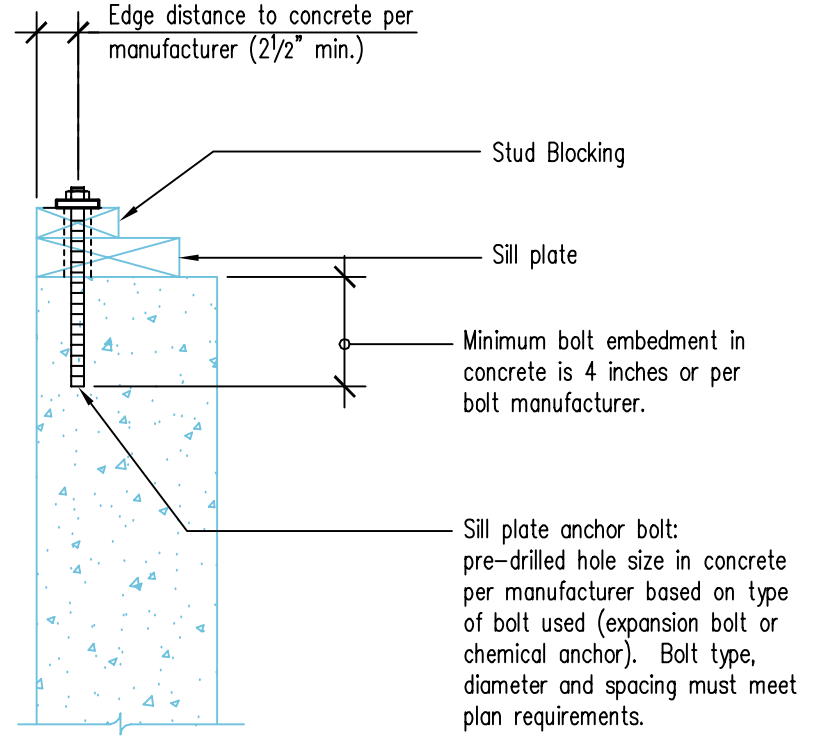


FRONT VIEW

1a VERTICAL ANCHOR DETAIL (sill plate width = pony wall width)



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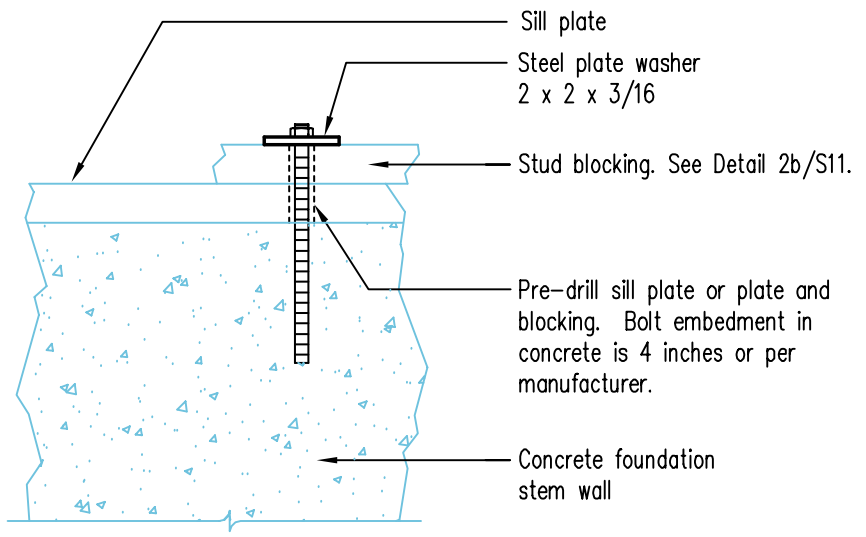

FRONT VIEW

1b VERTICAL ANCHOR DETAIL (sill plate wider than pony wall)

1 SILL PLATE ANCHOR DETAILS

- See Section III – General Notes (Sheets S5–S7) for materials, installation, and spacing requirements.
- Expansion bolts shall not be used when installation causes surface cracking of the foundation wall at the location of the bolt.

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EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

Plan Details Reference Sheet

Developed in cooperation with:

The City of Seattle	425 837-3100
The City of Redmond	425 556-2473
Building Industry Association of Washington	425 452-6864
City of Kirkland	425 828-1144

PROJECT IMPACT SEATTLE – Disaster Resistant Community

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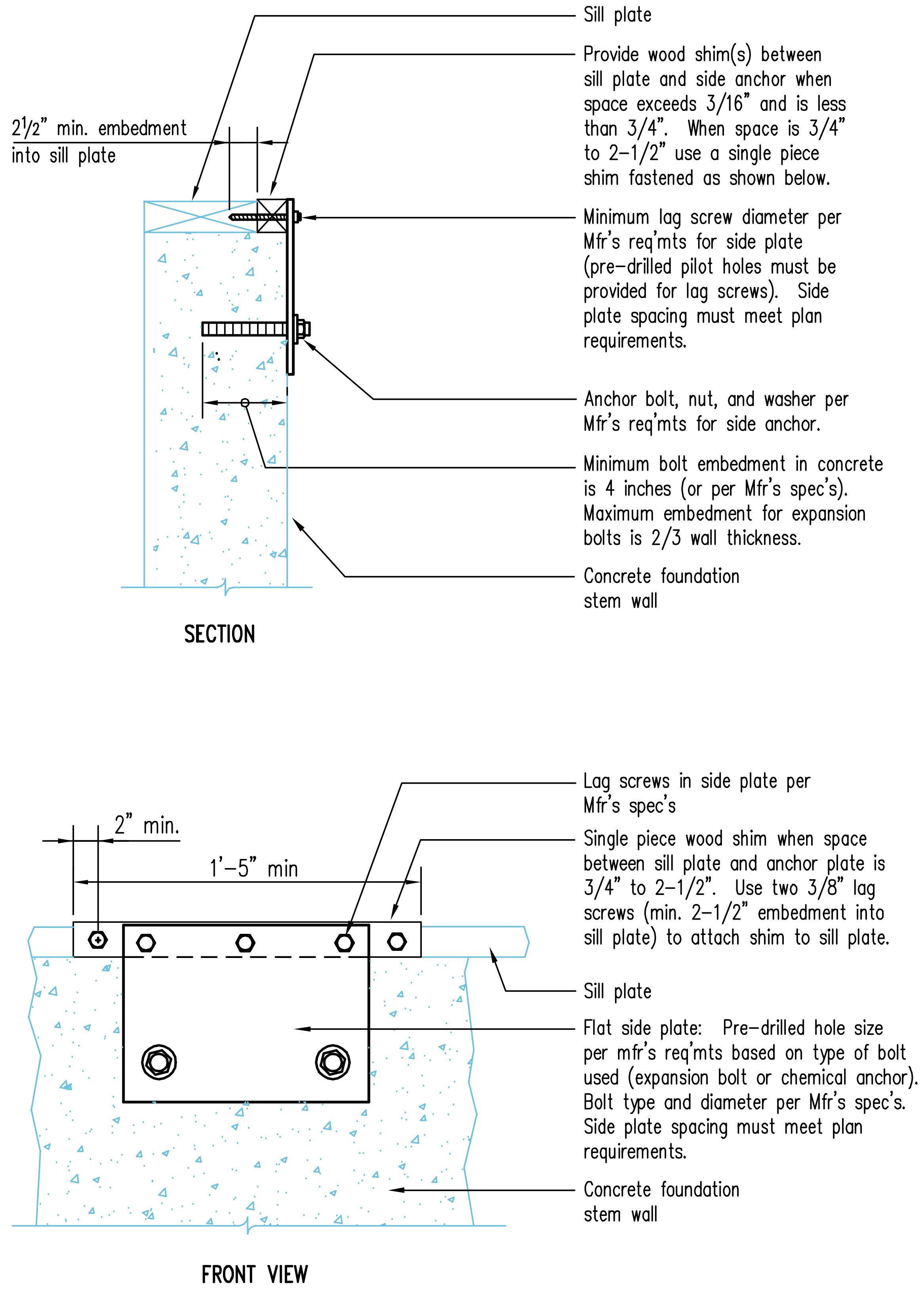
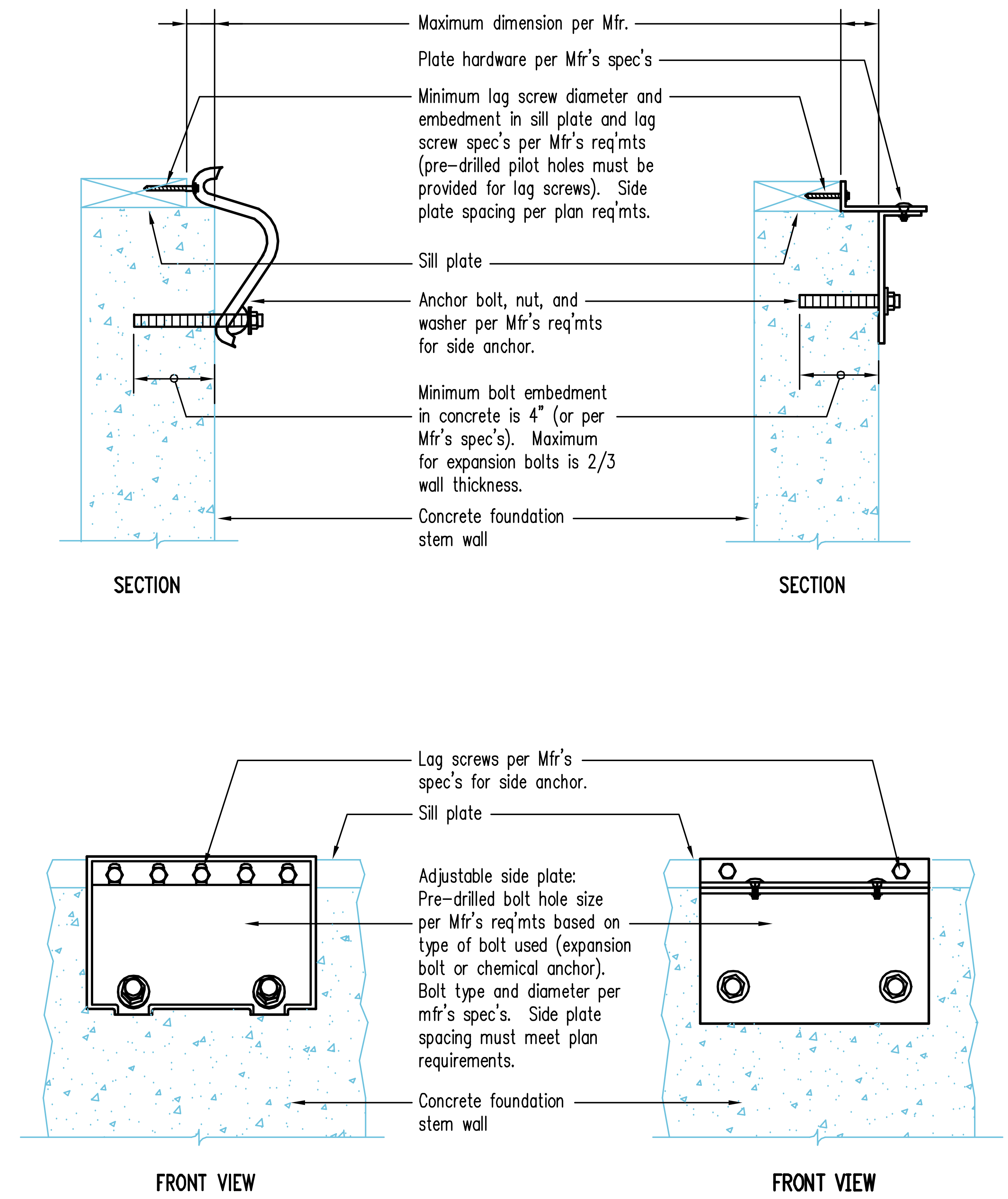
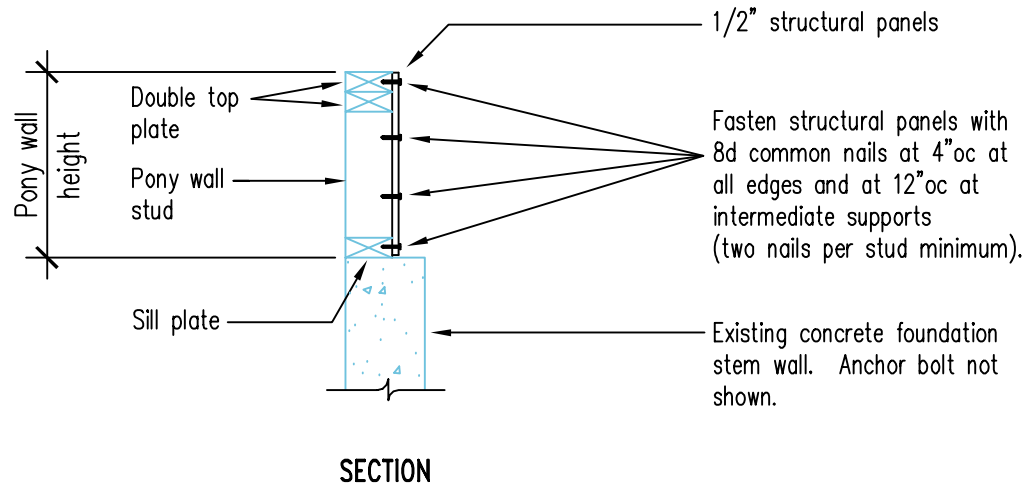

Sill plate
Provide wood shim(s) between sill plate and side anchor when space exceeds 3/16" and is less than 3/4". When space is 3/4" to 2-1/2" use a single piece shim fastened as shown below.
2½" min. embedment into sill plate
Minimum lag screw diameter per Mfr's req'mts for side plate (pre-drilled pilot holes must be provided for lag screws). Side plate spacing must meet plan requirements.
Anchor bolt, nut, and washer per Mfr's req'mts for side anchor.
Minimum bolt embedment in concrete is 4 inches (or per Mfr's spec's). Maximum embedment for expansion bolts is 2/3 wall thickness.
Concrete foundation stem wall
SECTION
2" min.
1'-5" min
Lag screws in side plate per Mfr's spec's
Single piece wood shim when space between sill plate and anchor plate is 3/4" to 2-1/2". Use two 3/8" lag screws (min. 2-1/2" embedment into sill plate) to attach shim to sill plate.
Sill plate
Flat side plate: Pre-drilled hole size per mfr's req'mts based on type of bolt used (expansion bolt or chemical anchor). Bolt type and diameter per Mfr's spec's. Side plate spacing must meet plan requirements.
Concrete foundation stem wall
FRONT VIEW

1c **SIDE ANCHOR DETAIL – Flat Side Plate**
No pony wall


Maximum dimension per Mfr.
Plate hardware per Mfr's spec's
Minimum lag screw diameter and embedment in sill plate and lag screw spec's per Mfr's req'mts (pre-drilled pilot holes must be provided for lag screws). Side plate spacing per plan req'mts.
Sill plate
Anchor bolt, nut, and washer per Mfr's req'mts for side anchor.
Minimum bolt embedment in concrete is 4" (or per Mfr's spec's). Maximum for expansion bolts is 2/3 wall thickness.
Concrete foundation stem wall
SECTION
SECTION
Lag screws per Mfr's spec's for side anchor.
Sill plate
Adjustable side plate: Pre-drilled bolt hole size per Mfr's req'mts based on type of bolt used (expansion bolt or chemical anchor). Bolt type and diameter per mfr's spec's. Side plate spacing must meet plan requirements.
Concrete foundation stem wall
FRONT VIEW
FRONT VIEW

1d **SIDE ANCHOR DETAIL – Adjustable Side Plates**
No pony wall

1 SILL PLATE ANCHOR DETAILS (CONT'D.)



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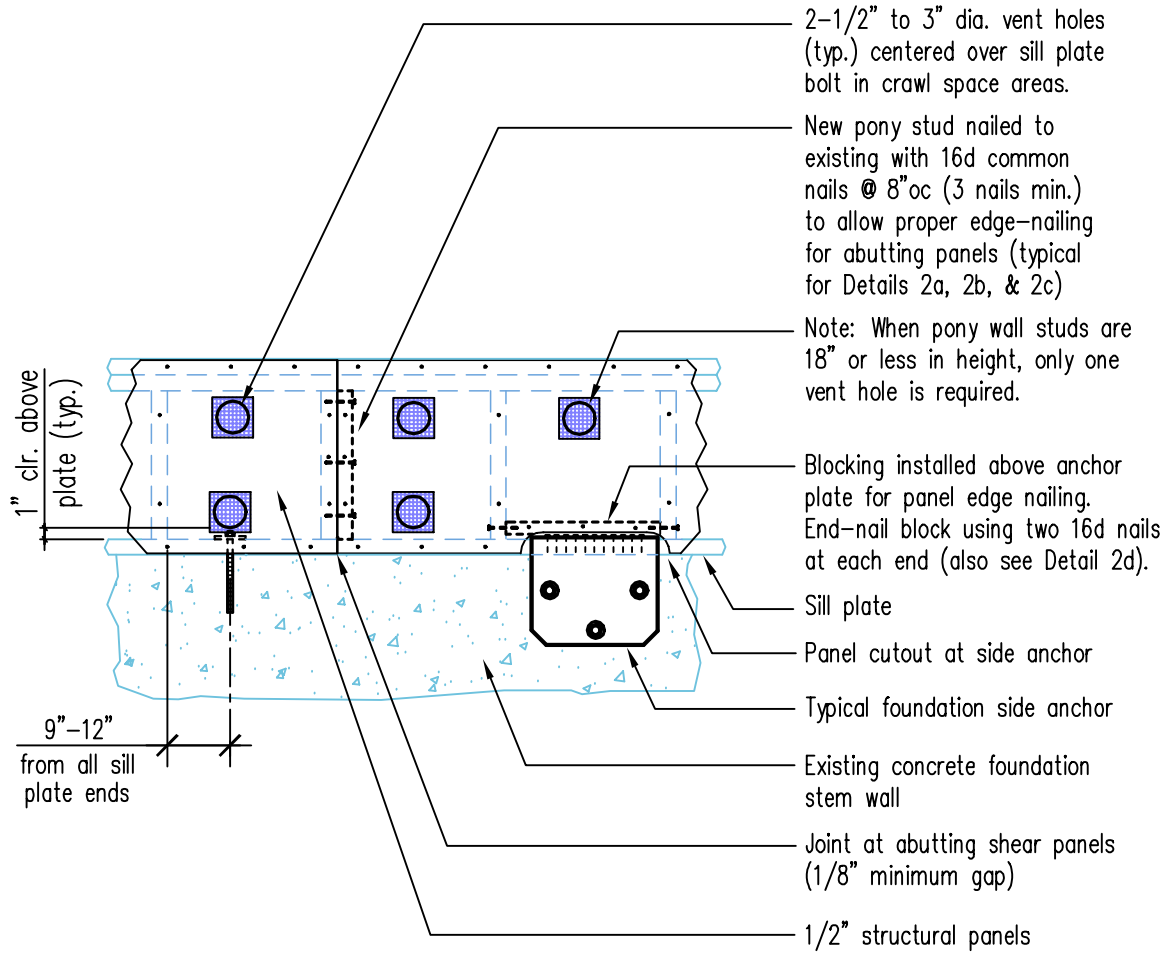
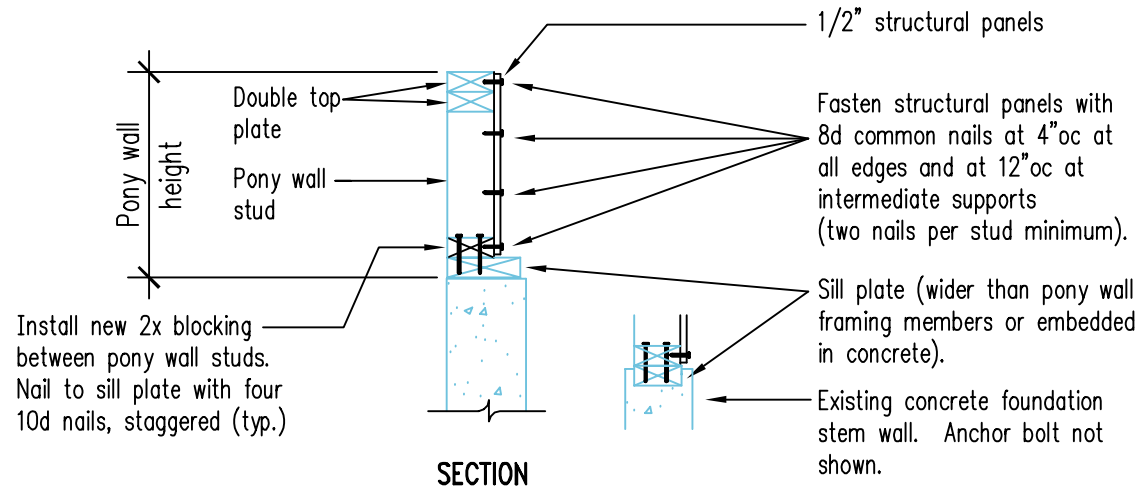


FRONT VIEW

2a SILL PLATE SAME WIDTH AS PONY WALL



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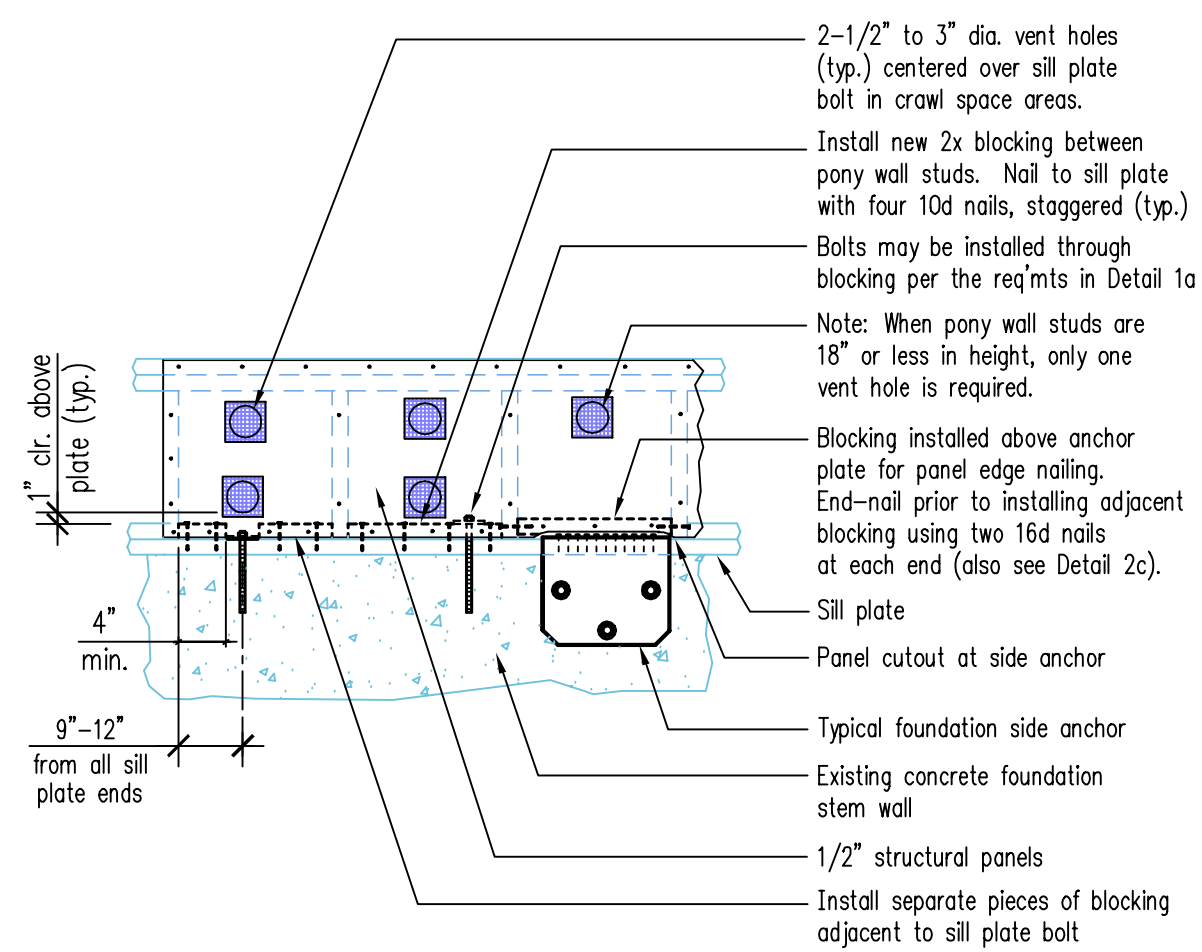

FRONT VIEW

2b SILL PLATE WIDER THAN PONY WALL

2 PONY WALL BRACING DETAILS

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

Plan Details Reference Sheet

Developed in cooperation with:

CITY OF SEATTLE 425 837–3100
CITY OF REDMOND 425 556–2473
CITY OF BELLEVUE 425 452–6864
CITY OF KIRKLAND 425 828–1144

PROJECT IMPACT SEATTLE DISASTER RESISTANT COMMUNITY BUILDING

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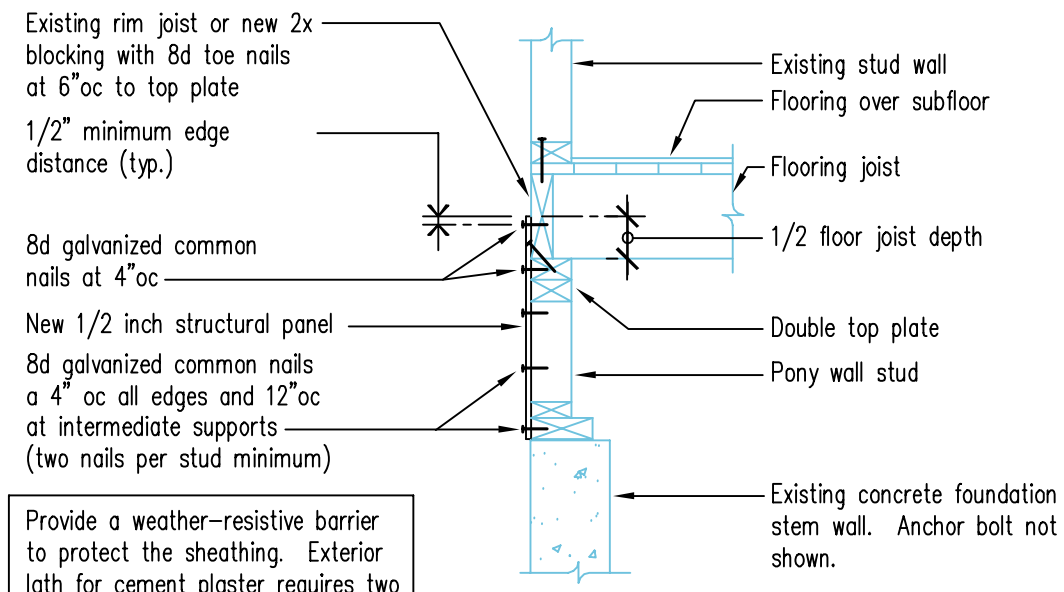
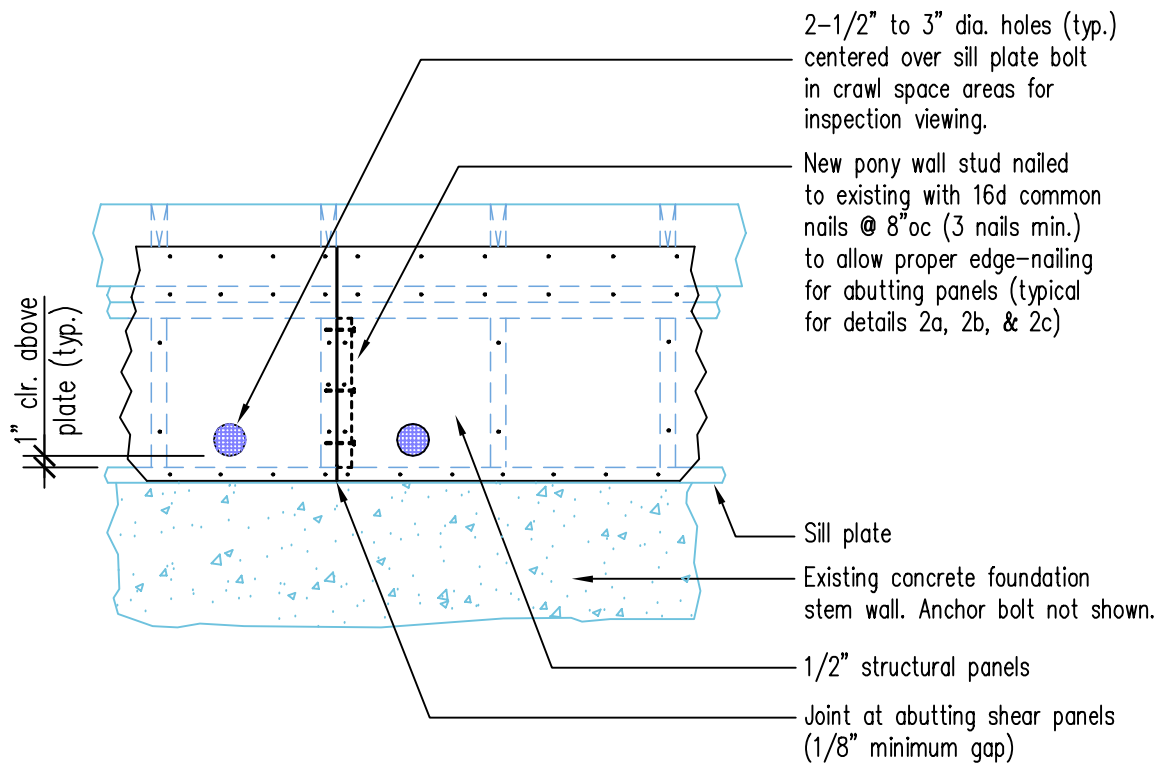


Provide a weather-resistive barrier to protect the sheathing. Exterior lath for cement plaster requires two layers of grade D paper over the sheathing

SECTION

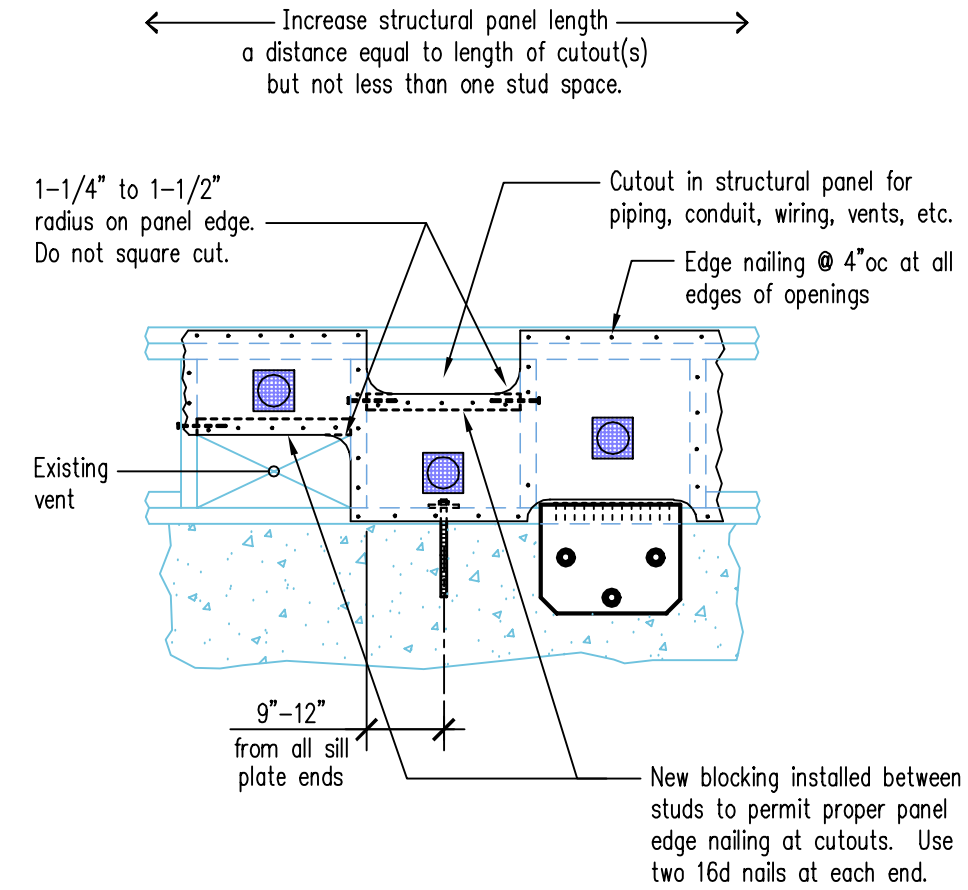


FRONT VIEW

2c STRUCTURAL PANEL INSTALLED ON EXTERIOR FACE OF PONY STUDS

TYPICAL PONY WALL BRACING NOTES:

1. Structural panels shall be 1/2" CDX, Oriented Strand Board, or Structural II and shall be installed in accordance with the size, spacing, and hardware specifications in Details 2a through 2e and General Notes (Section III, Sheets S5-S7).
2. Nails: All 8d and 10d nails shall be "common" nails with 8d shank diameter equal to .131 inches and 10d shank diameter equal to .148 inches.
3. Leave screens for ventilation holes at anchors unfastened until the anchors are inspected. No vent holes are required in heated areas, such as finished basements, or exterior panel installations.



FRONT VIEW

2d PANEL CUTOUTS AND NOTCHING

2 PONY WALL BRACING DETAILS

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

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CITY OF BELLEVUE 425 452-6864
CITY OF KIRKLAND 425 828-1144

PROJECT IMPACT SEATTLE DISASTER RESISTANT COMMUNITY BUILDING

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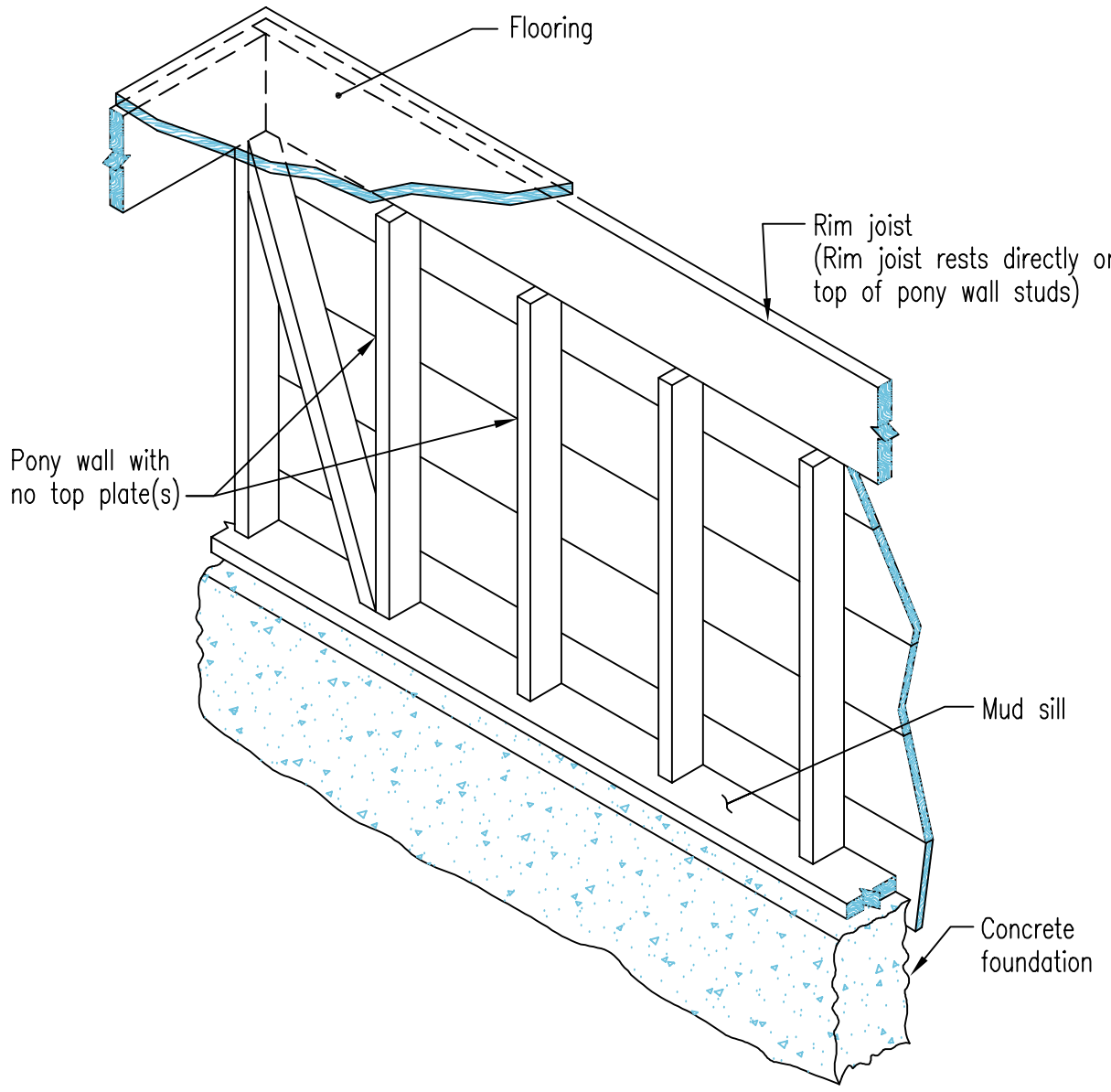
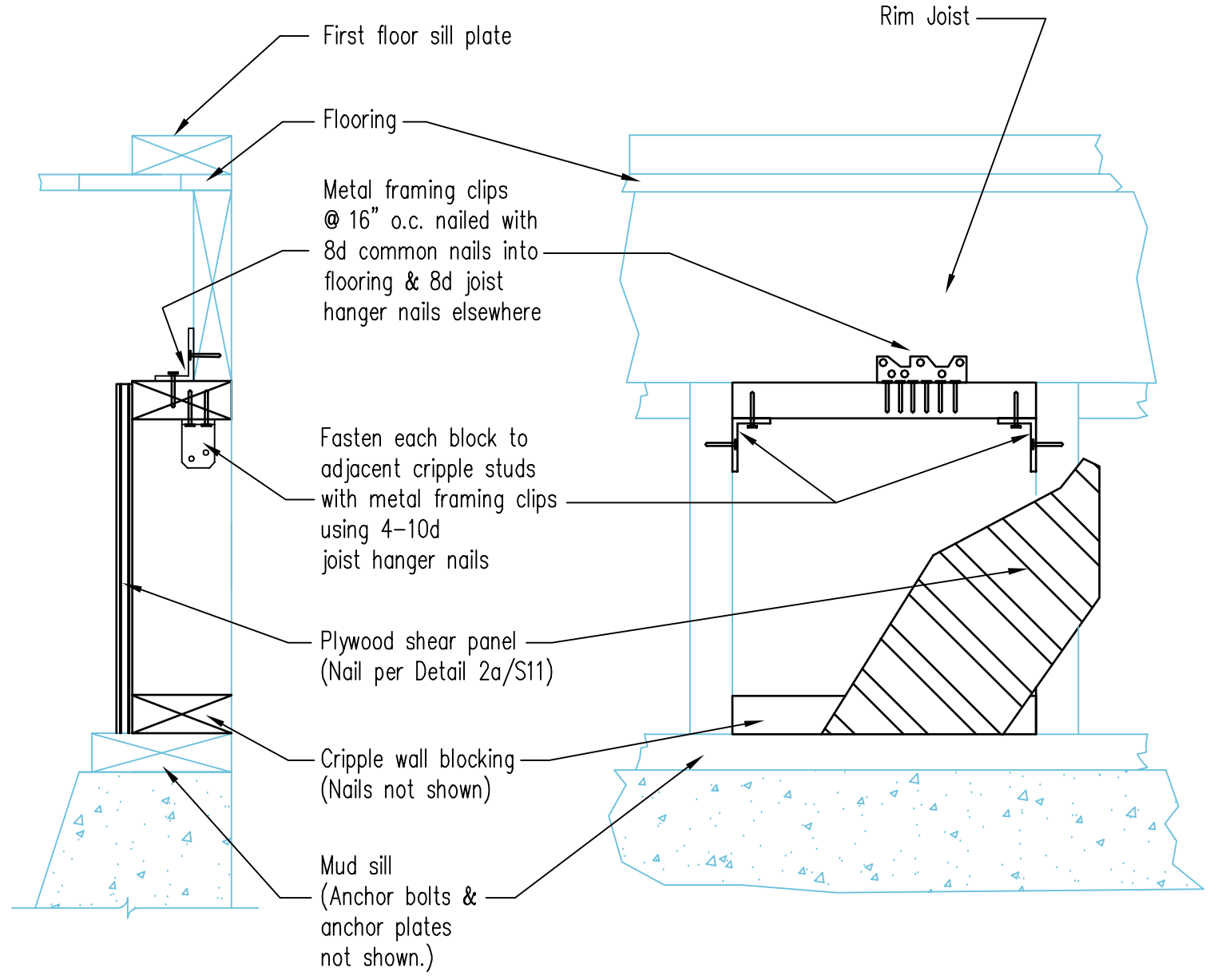


ISOMETRIC VIEW



SIDE VIEW

FRONT VIEW

PROBLEM:
No pony wall top plate(s)

SOLUTION:
Framing modifications are necessary to provide the required nailing surfaces for the plywood shear panels and to ensure connections which complete the load path between the pony wall and the floor system.

2e PONY WALL BRACING FOR PONY WALLS WITHOUT TOP PLATES

3 PONY WALL BRACING DETAILS FOR PONY WALLS WITHOUT TOP PLATES

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

Plan Details Reference Sheet

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PROJECT IMPACT SEATTLE DISASTER RESISTANT COMMUNITY BUILDING

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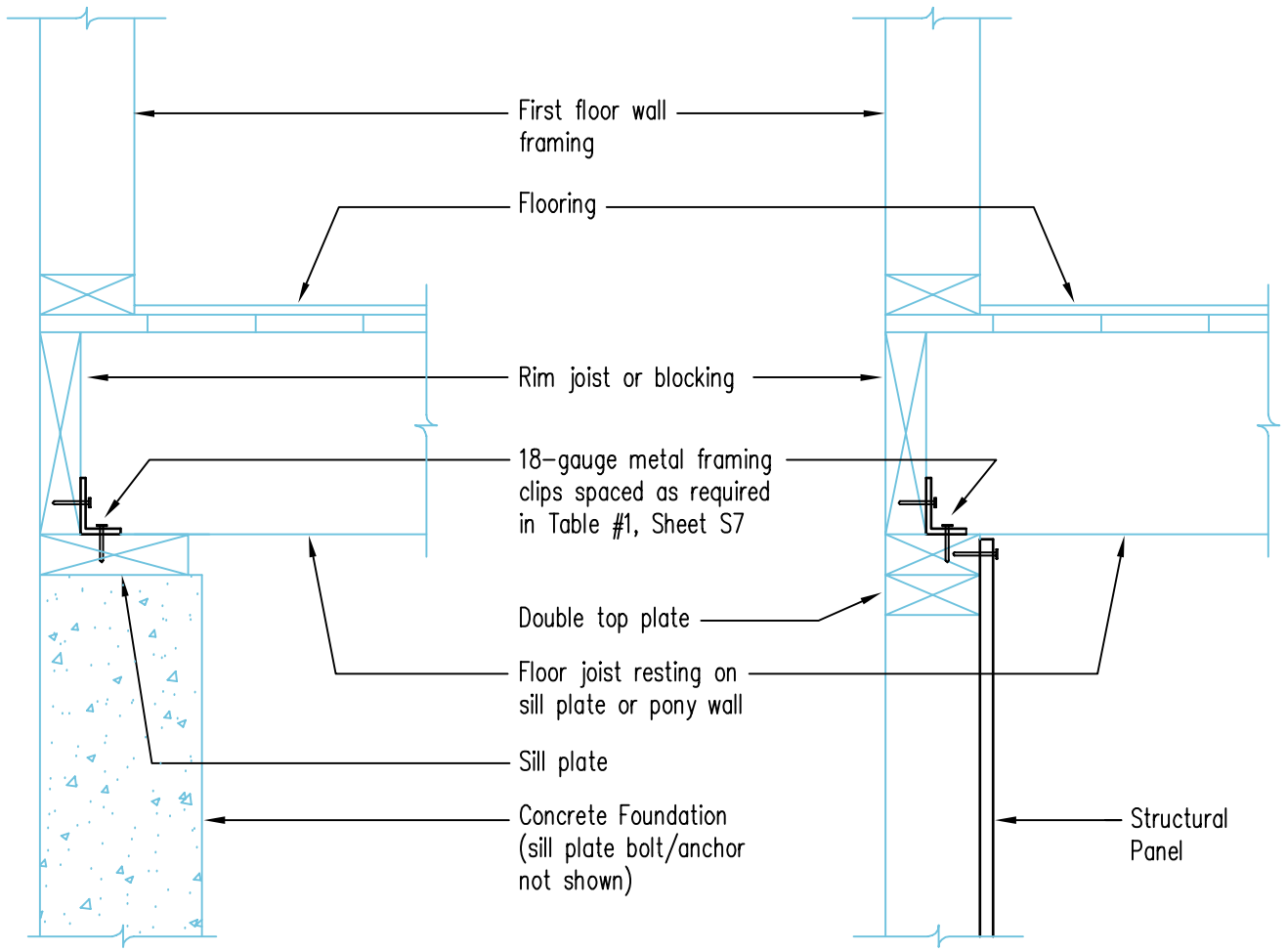
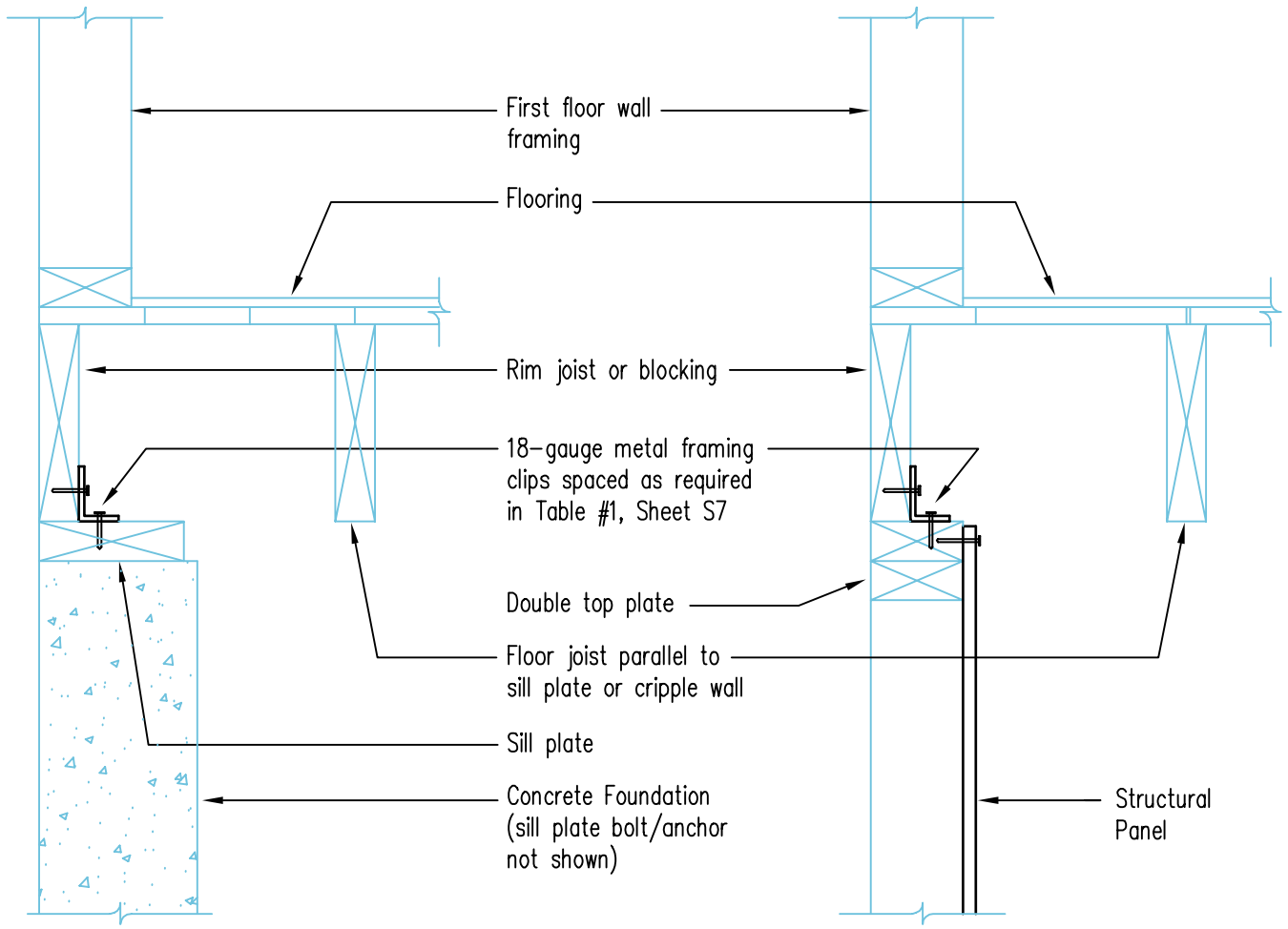


SECTION SECTION

3a FLOOR JOIST PERPENDICULAR TO SILL PLATE OR PONY WALL



SECTION SECTION

3b FLOOR JOIST PARALLEL TO SILL PLATE OR PONY WALL

3 FLOOR FRAMING CONNECTION DETAILS

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

Plan Details Reference Sheet

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CITY OF BELLEVUE 425 452-6864
CITY OF KIRKLAND 425 828-1144

PROJECT IMPACT SEATTLE DISASTER RESISTANT COMMUNITY BUILDING

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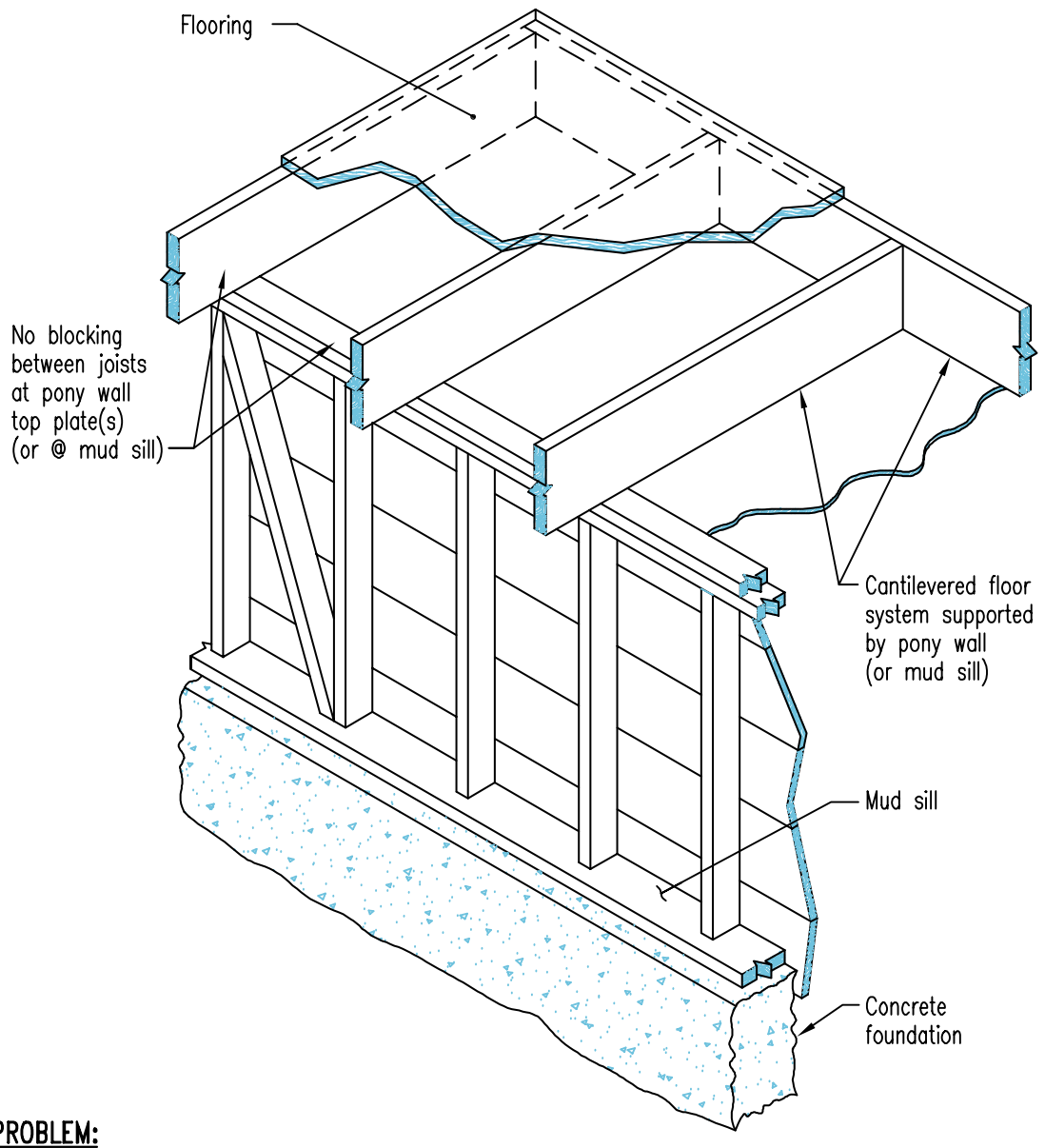
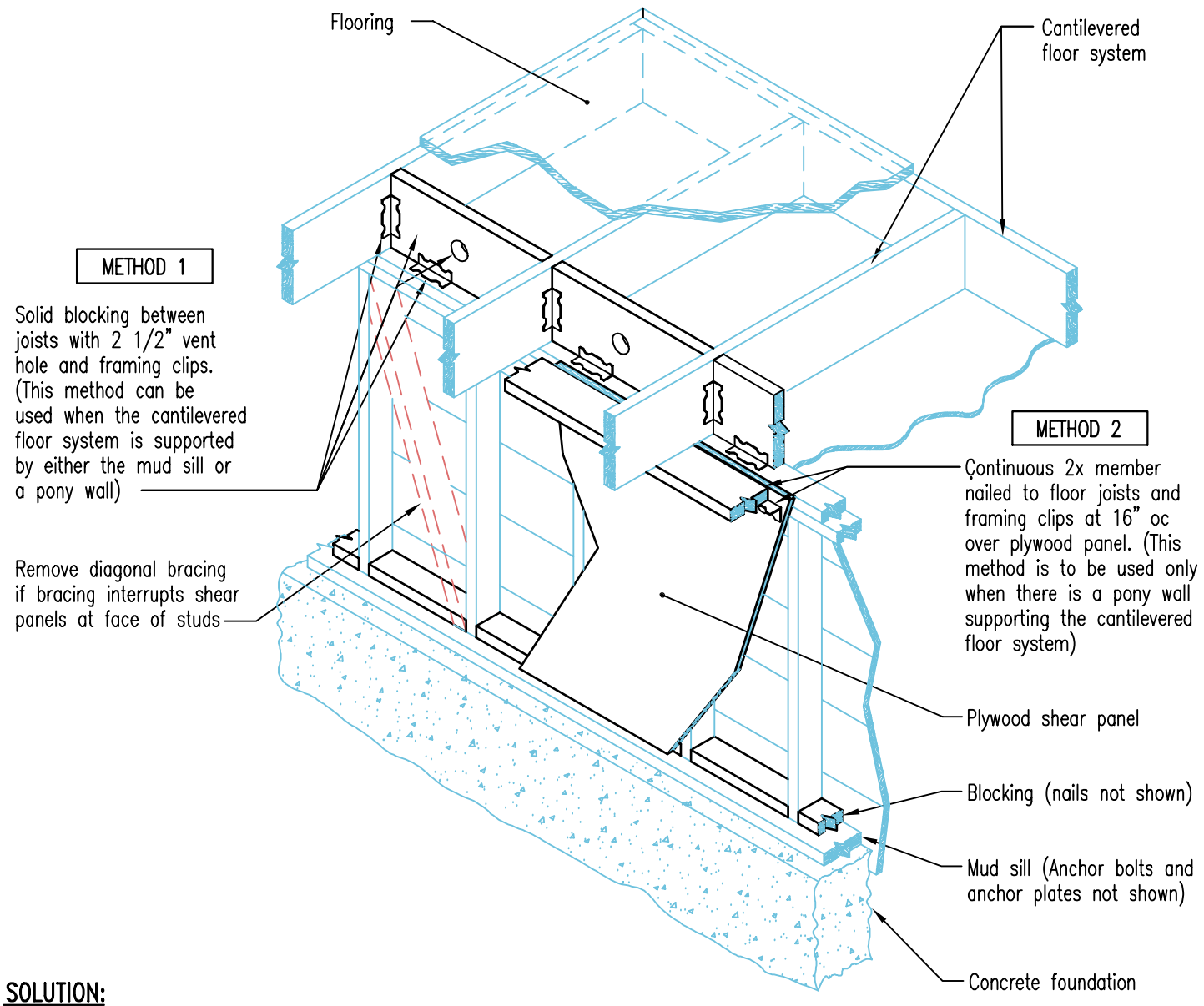


PROBLEM:
Lack of blocking above pony wall at cantilevered floor results in no framing elements on which to install framing clips.



SOLUTION:
Framing modifications are necessary to provide the required nailing surfaces for the framing clips and to ensure connections that complete the load path between the pony wall and the floor system (See details on sheet S-16)

(3) FLOOR FRAMING AT CANTILEVERED FLOORS CONNECTION DETAILS

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

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PROJECT IMPACT SEATTLE DISASTER RESISTANT COMMUNITY BUILDING

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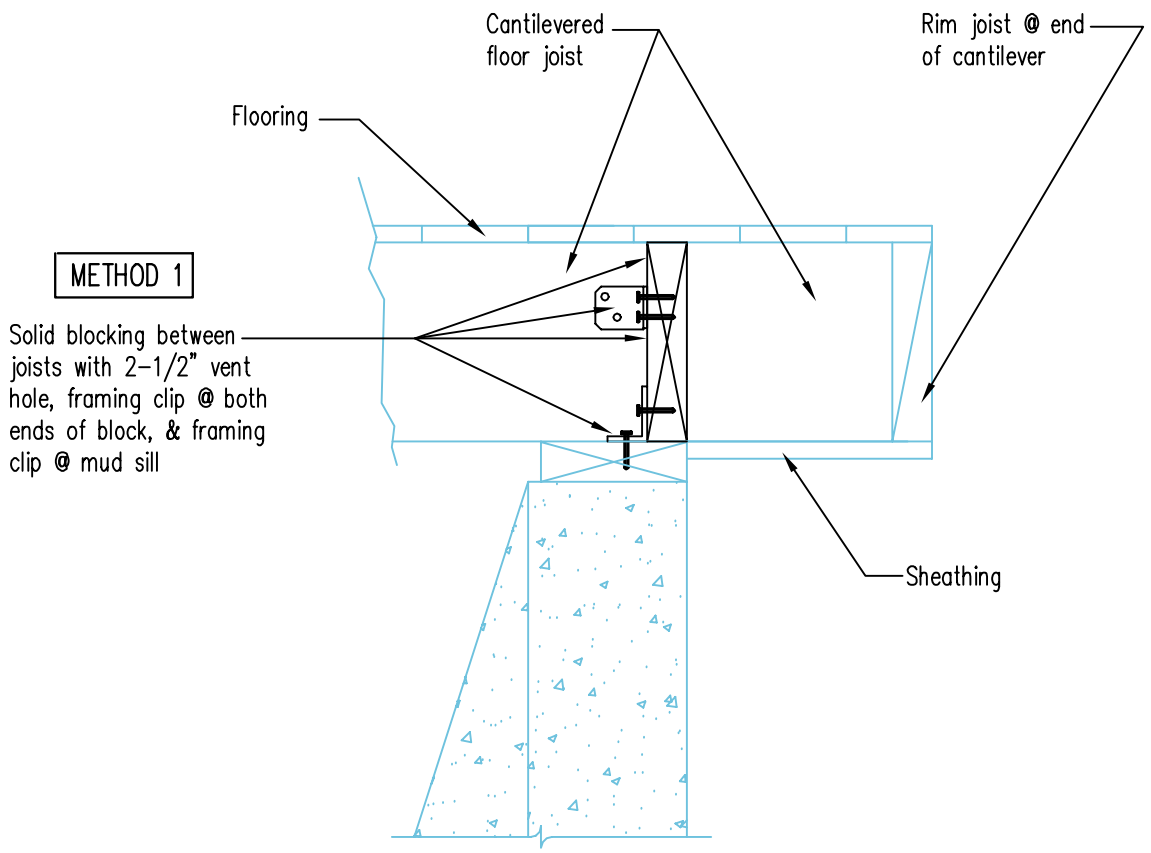
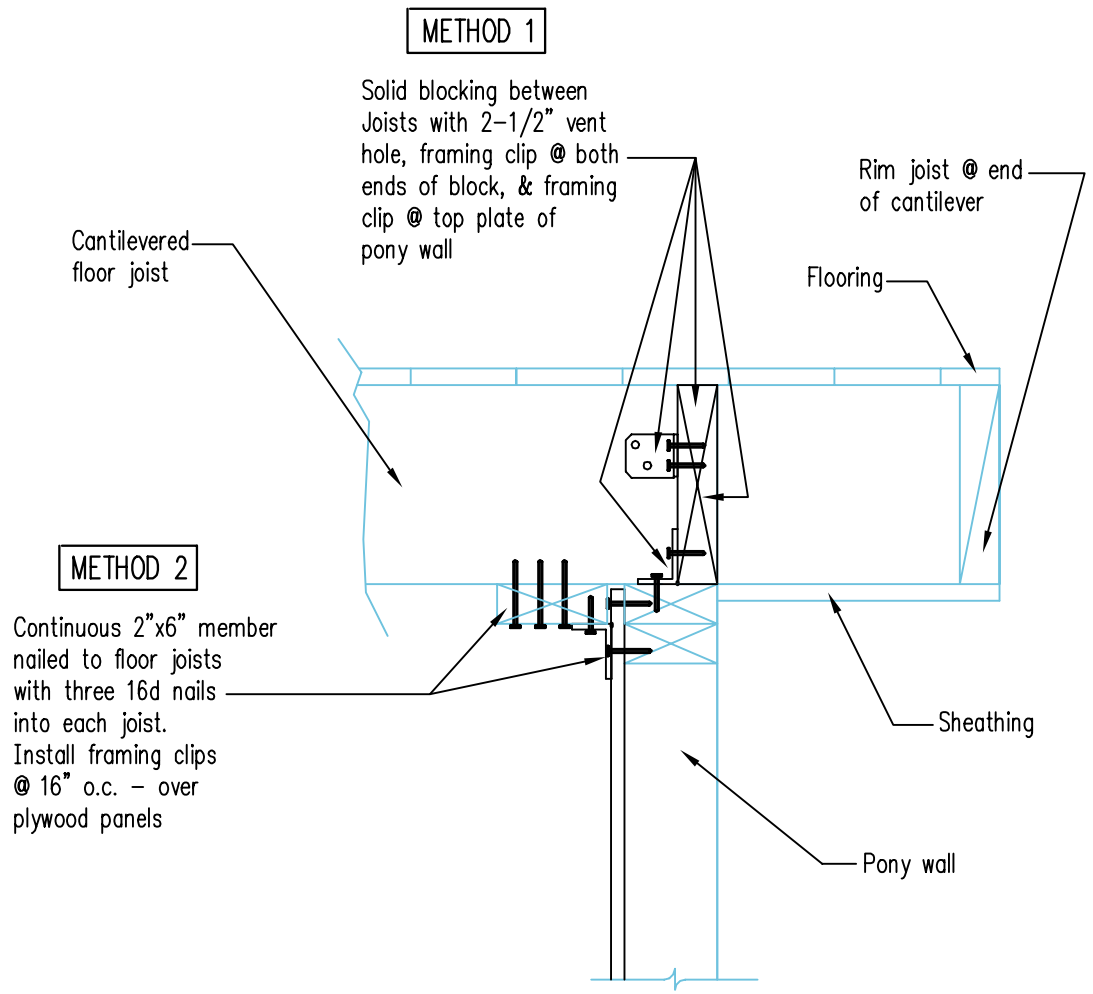


SIDE VIEW

3c CANTILEVER ABOVE MUD SILL

REPAIR DETAIL FOR CANTILEVERED FLOOR WITH NO BLOCKING
ABOVE SILL PLATE
(Install solid blocking between joists – "METHOD 1")



SIDE VIEW

3d CANTILEVER ABOVE PONY WALL

REPAIR DETAIL FOR CANTILEVERED FLOOR WITH NO BLOCKING
ABOVE PONY WALL
(Install solid blocking between joists – "METHOD 1"
or install continuous 2x member – "METHOD 2")

3 FLOOR FRAMING CONNECTION DETAILS AT CANTILEVERED FLOORS

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING
WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK
PONY WALLS AND UNBOLTED SILL PLATES

Plan Details Reference Sheet

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CITY OF REDMOND, WASHINGTON 425 556-2473
BELLEVUE 425 452-6864
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PROJECT IMPACT SEATTLE
BUILDING A DISASTER RESISTANT COMMUNITY

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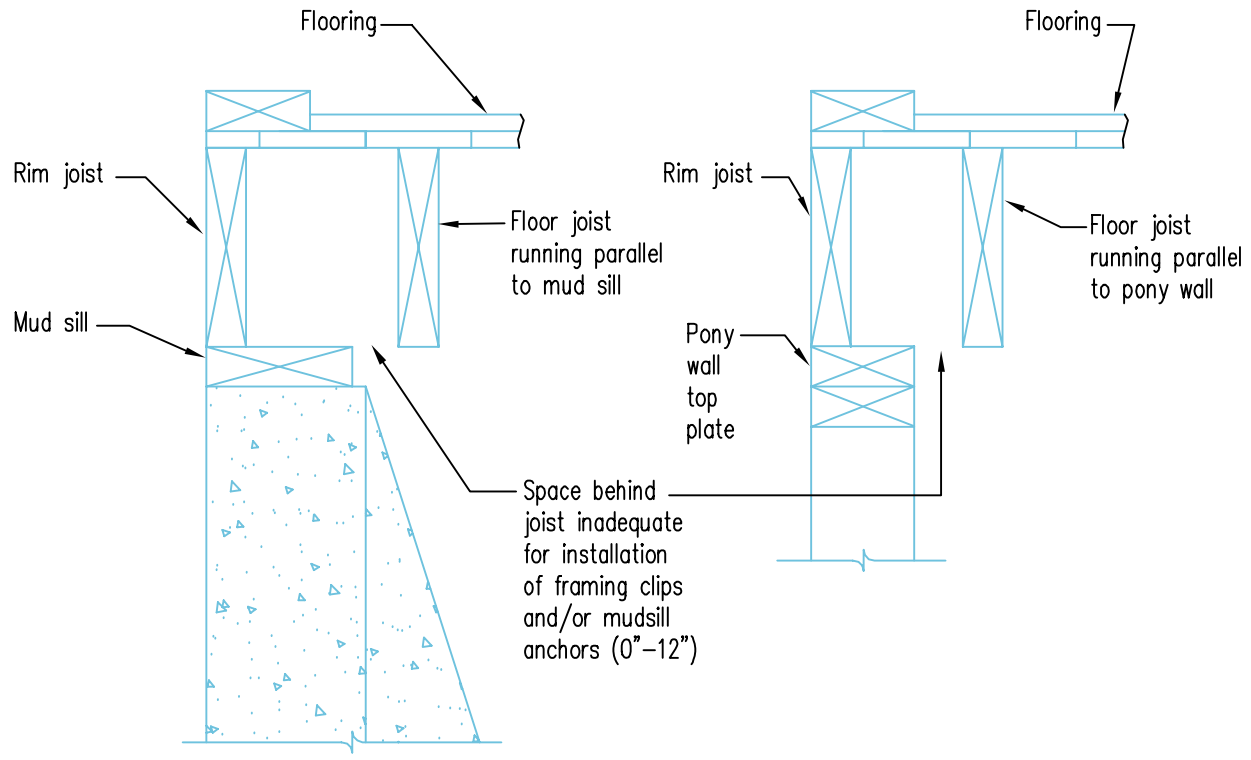
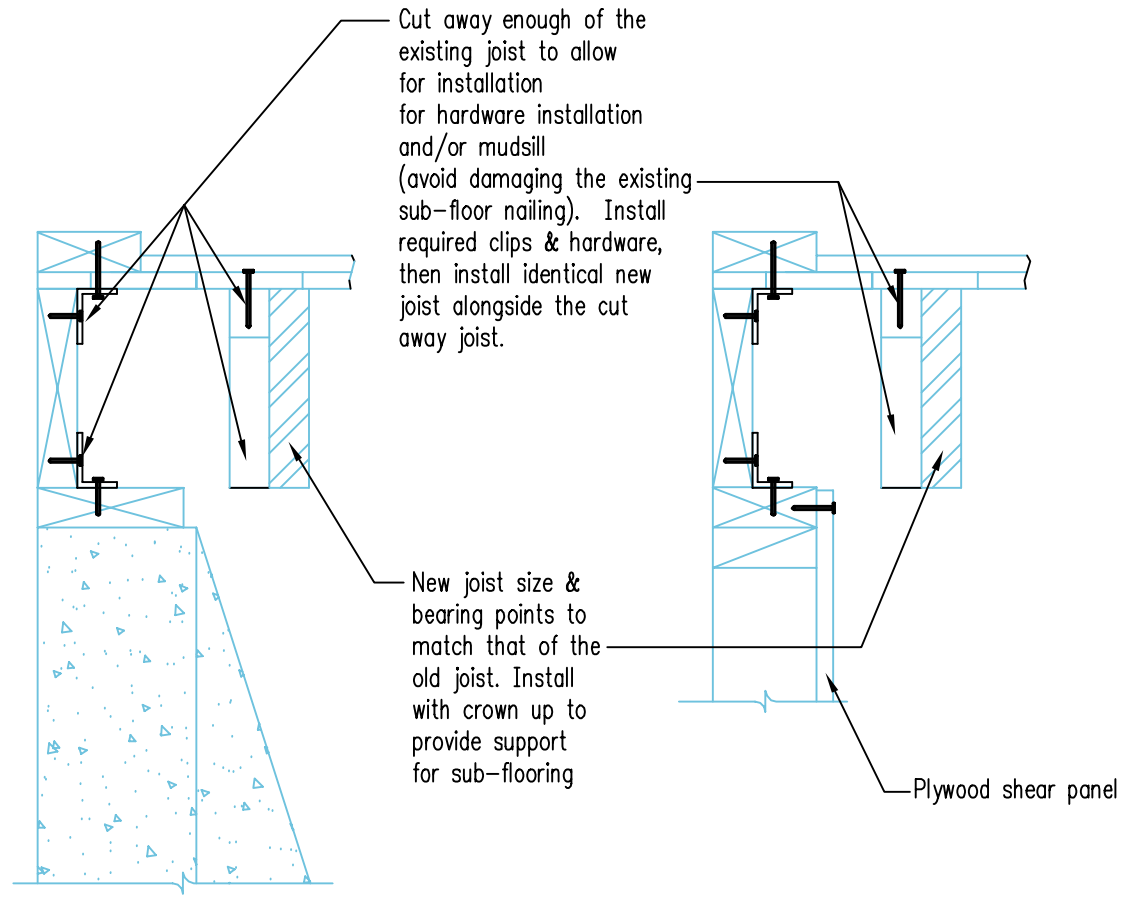


SIDE VIEW
WITH FOUNDATION WALL

SIDE VIEW
WITH PONY WALL

Problem:
Inadequate space between rim joist & floor joist results in no room to install framing clips and/or anchors



SIDE VIEW
WITH FOUNDATION WALL

SIDE VIEW
WITH PONY WALL

3e INADEQUATE CLEARANCE

Solution:
Framing modifications are necessary to allow access to the rim joist and the mud sill (or the top of the pony wall) to permit the installation of the required framing clips and/or mud sill anchors.

3 FLOOR FRAMING CONNECTION DETAILS

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

Plan Details Reference Sheet

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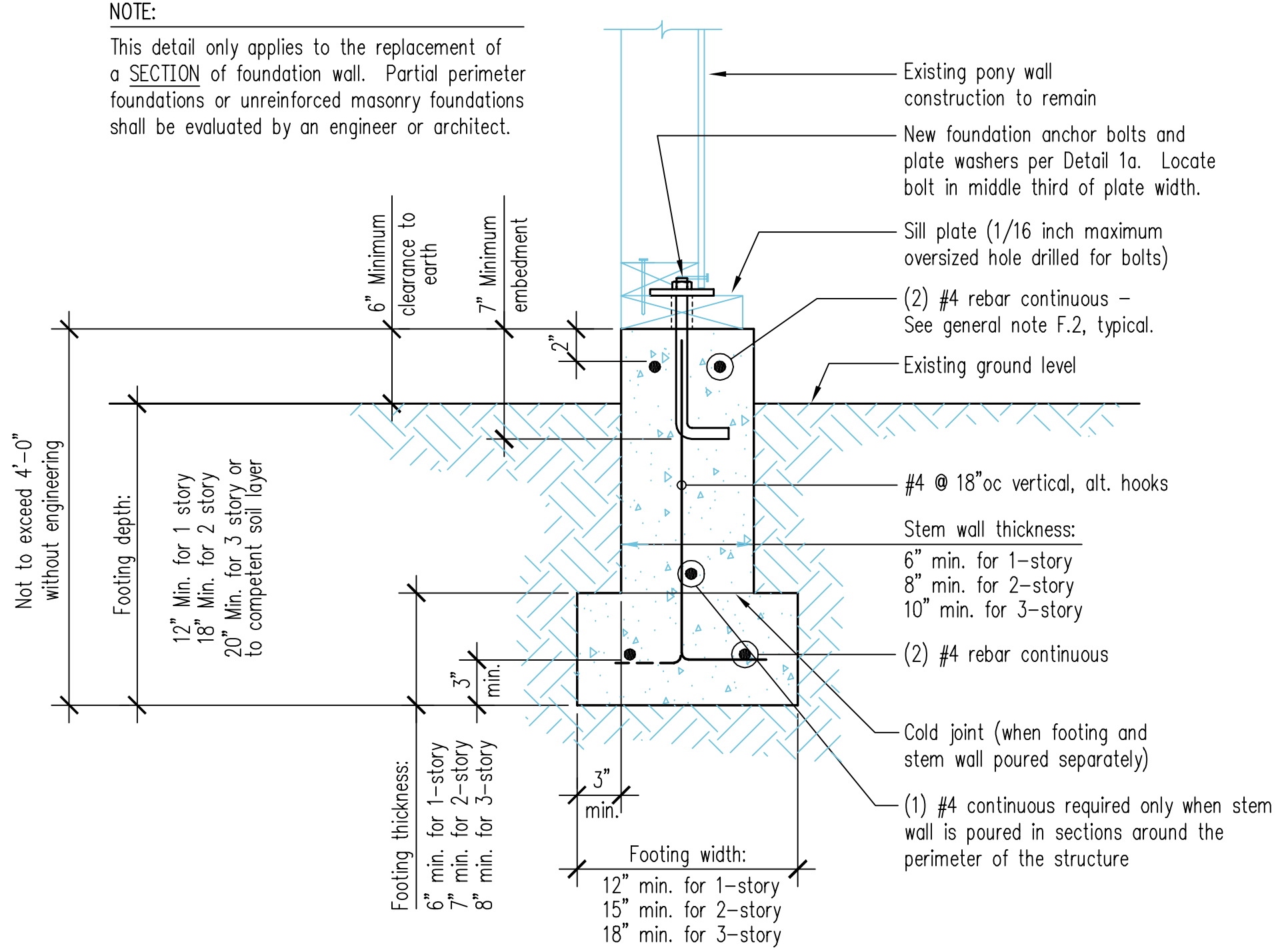
NOTE:

This detail only applies to the replacement of a SECTION of foundation wall. Partial perimeter foundations or unreinforced masonry foundations shall be evaluated by an engineer or architect.



SIDE VIEW

REFERENCE: 1997 UCBC, FIGURE A-6-1

(F) CONCRETE FOUNDATION – SECTION REPLACEMENT

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

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CITY OF SEATTLE 425 837-3100
CITY OF REDMOND 425 556-2473
CITY OF BELLEVUE 425 452-6864
CITY OF KIRKLAND 425 828-1144

PROJECT IMPACT SEATTLE – BUILDING A DISASTER RESISTANT COMMUNITY

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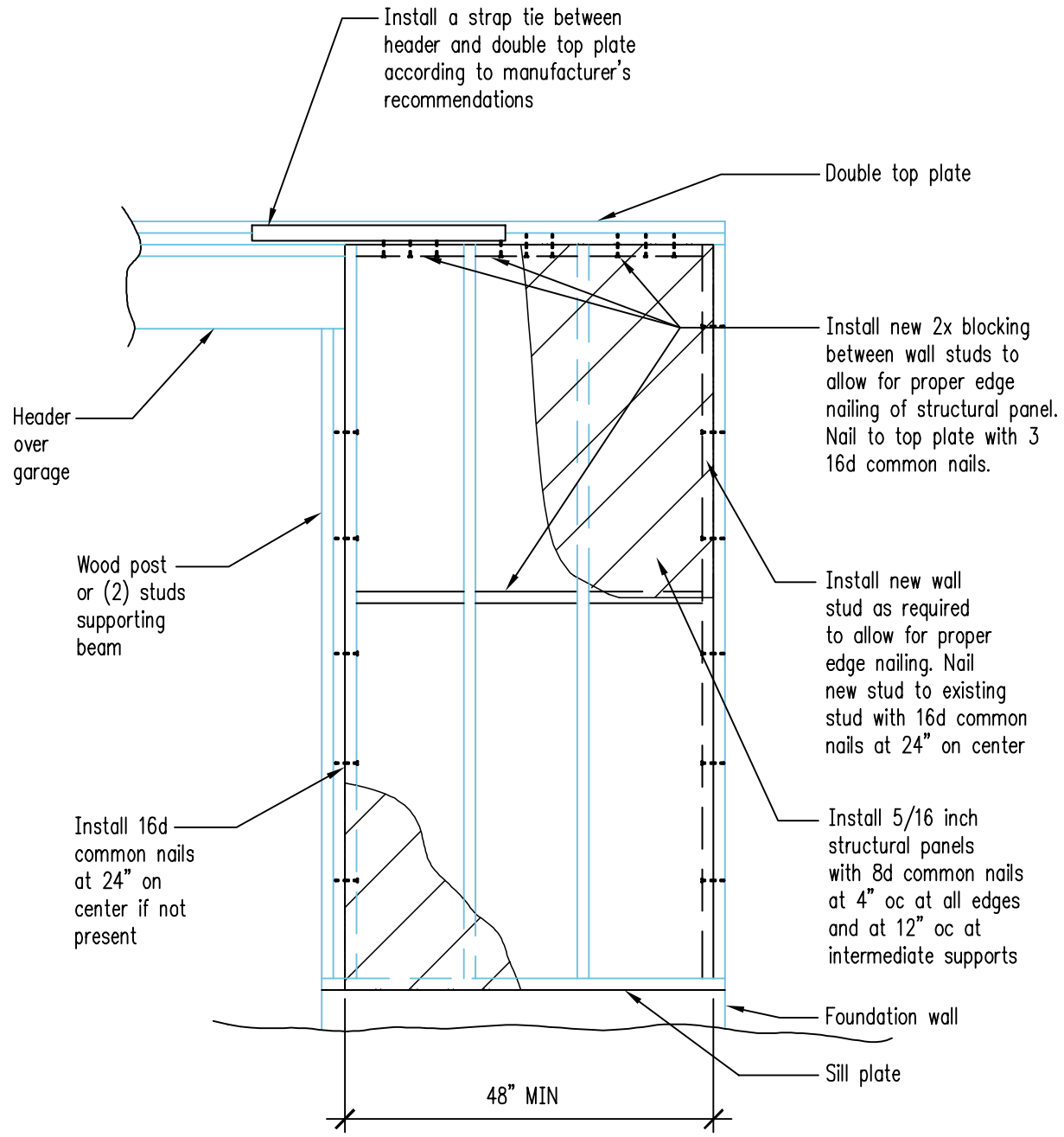

4a WALL BRACING AT GARAGE DOORS WITH 48 INCH MIN. WIDTH
Reference UBC Section 2320.11.3, Method 3

4 WALL BRACING AT GARAGE DOORS

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

Plan Details Reference Sheet

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THE CITY OF REDMOND — 425 556-2473
BELLEVUE NEIGHBORHOOD OUTREACH — 425 452-6864
CITY OF KIRKLAND — 425 828-1144

PROJECT IMPACT SEATTLE — BUILDING A DISASTER RESISTANT COMMUNITY

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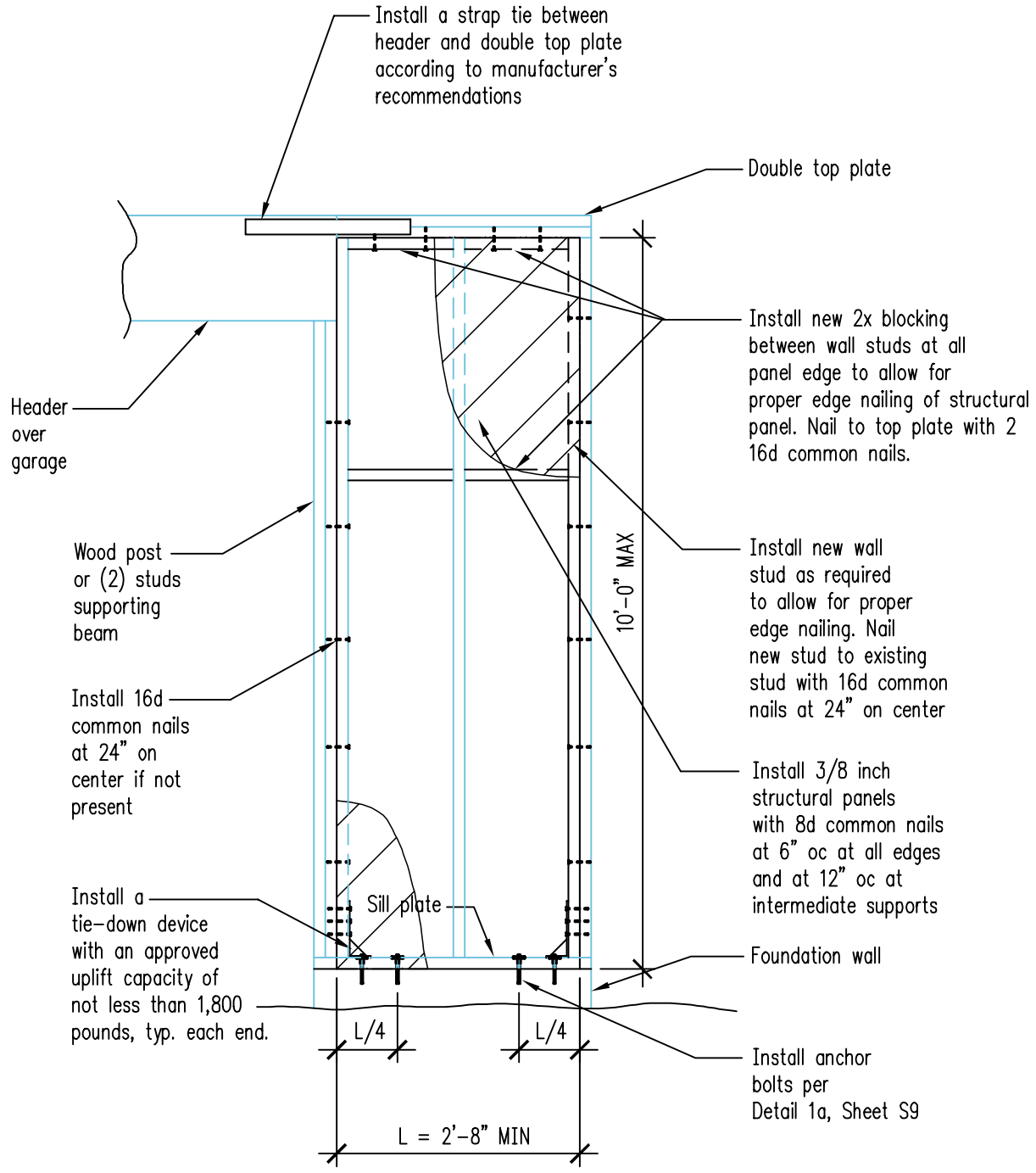
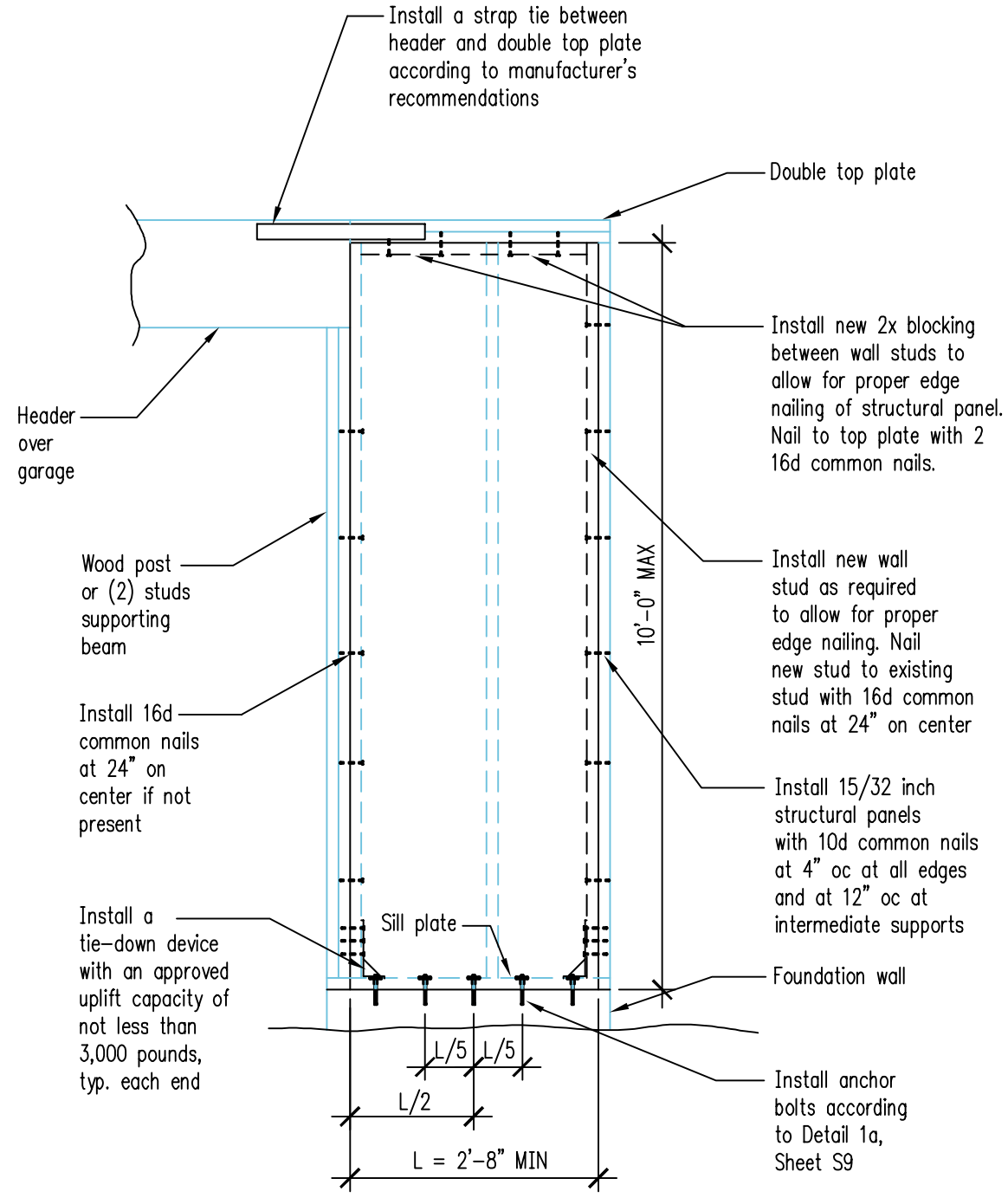


4b WALL BRACING AT GARAGE DOORS WITH 32 INCH MIN. WIDTH
Reference UBC Section 2320.11.4, Method 1



4c WALL BRACING AT GARAGE DOORS WITH 32 INCH MINIMUM WIDTH WITH FLOOR ABOVE
Reference UBC Section 2320.11.4, Method 2, and UBC Table 23-II-I-1

4 WALL BRACING AT GARAGE DOORS (CONT'D.)

January 2001

Standard Home Earthquake Retrofit (SHER) Plan Set

EARTHQUAKE DAMAGE REDUCTION IN EXISTING WOOD FRAME RESIDENTIAL BUILDINGS WITH WEAK PONY WALLS AND UNBOLTED SILL PLATES

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CITY OF REDMOND 425 556-2473
CITY OF BELLEVUE 425 452-6864
CITY OF KIRKLAND 425 828-1144

PROJECT IMPACT SEATTLE DISASTER RESISTANT COMMUNITY BUILDING

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